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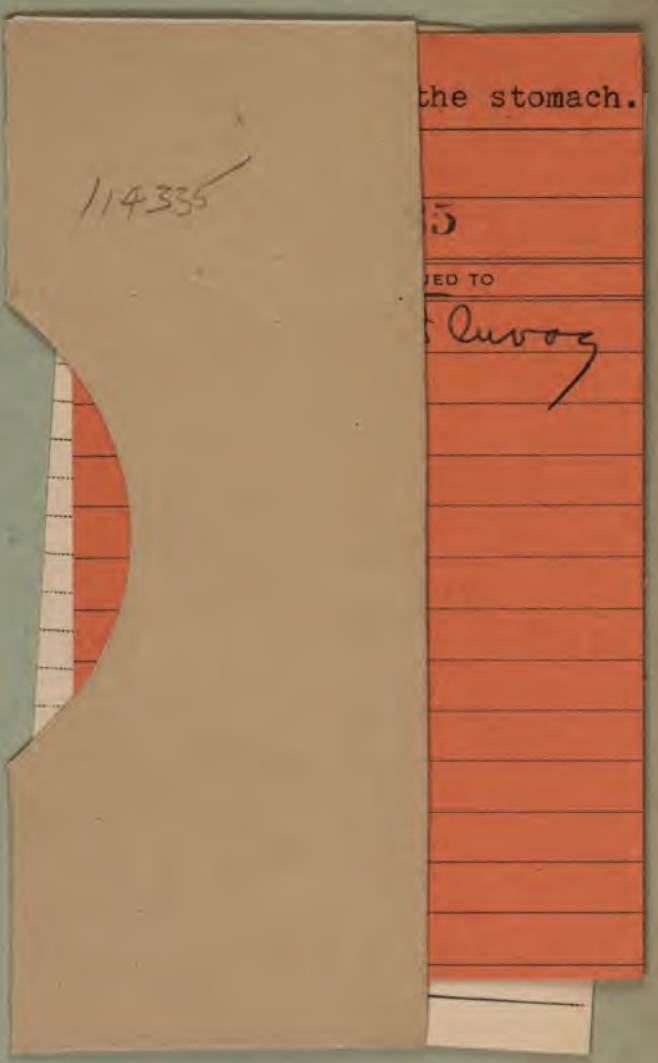

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CANCER OF THE STOMACH

A CLINICAL STUDY

BY

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WITH ILLUSTRATIONS

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CONTENTS

CHAPTER I.

GENERAL ETIOLOGY.

PAGE

CANCER IN GENERAL—QUESTION OF ITS INCREASE—HAS CANCER OF THE STOMACH INCREASED IN FREQUENCY?—STATISTICS OF CANCER OF THE STOMACH AT THE JOHNS HOPKINS HOSPITAL—SEX—AGE—RACE—CONJUGAL CONDITION—FAMILY HISTORY OF CANCER—TUBERCULOSIS—PREVIOUS STOMACH TROUBLES—ALCOHOL—MISCELLANEOUS CONDITIONS—TRAUMA—GENERAL CONCLUSIONS . . . 1

CHAPTER II.

CANCER OF THE STOMACH IN THE YOUNG.

INTRODUCTION—CANCER OF THE STOMACH IN CHILDHOOD; ANALYSIS OF THE RECORDED CASES—CANCER OF THE STOMACH IN THE SECOND DECADE; ANALYSIS OF THE RECORDED CASES—CANCER OF THE STOMACH IN THE THIRD DECADE; REPORT OF CASES—PECULIARITIES OF CANCER OF THE STOMACH IN THE YOUNG . . 16

CHAPTER III.

SYMPTOMS.

GENERAL; SYMPTOMS ON ADMISSION—MODE OF ONSET—ANALYSIS OF SYMPTOMS OF ONSET—TIME OF ONSET BEFORE ADMISSION—SYMPTOMS IN DETAIL—PAIN—VOMITING—VOMITING OF BLOOD—OFFENSIVE VOMITUS 28

CHAPTER IV.

SYMPTOMS (continued).

APPETITE AND DIGESTION—LOSS OF WEIGHT AND STRENGTH—EXAMINATION OF STOMACH CONTENTS—MICROSCOPICAL EXAMINATION—FEVER—ENLARGED GLANDS—BOWELS—URINE 38

114335

CHAPTER V.

ASSOCIATED AND SECONDARY SYMPTOMS.

PAGE

PERFORATION; METASTASES AT NAVEL AND BENEATH SKIN OF ABDOMEN; JAUNDICE; ASCITES; ŒDEMA; OCCURRENCE OF THROMBI . 49

CHAPTER VI.

STUDY OF THE TUMOUR.

GENERAL CONSIDERATIONS—INSPECTION OF THE ABDOMEN—MOBILITY OF GASTRIC TUMOURS—RESPIRATORY, COMMUNICATED, INTRINSIC AND MECHANICAL—ILLUSTRATIVE CASES—INFLUENCE OF INFLATION 58

CHAPTER VII.

STUDY OF THE TUMOUR (continued).

TUMOUR FORMED BY THE DILATED STOMACH—GENERAL FEATURES—ANALYSIS OF CASES—VARIETIES OF PERISTALSIS—LOCAL TUMOURS WITH THE DILATED STOMACH—HOUR-GLASS STOMACH—FEATURES ASSOCIATED WITH DILATATION—ILLUSTRATIVE CASES 68

CHAPTER VIII.

STUDY OF THE TUMOUR (continued).

TUMOUR FORMED BY THE CONTRACTED STOMACH—VARIETIES—WITH GROWTH AT THE CARDIA—WITH GENERAL INVOLVEMENT—ANALYSIS OF THE SYMPTOMS—CASES—DIAGNOSIS FROM CIRRHOSIS VENTRICULI—RESUMÉ OF SYMPTOMS 83

CHAPTER IX.

STUDY OF THE TUMOUR (continued).

TUMOURS OF THE PYLORIC REGION—SOME COMMON FEATURES—THREE GROUPS.—I. WITH THICKENING AND INDURATION—CASES—ESTIMATION OF THE DEGREE OF INVOLVEMENT—DIAGNOSIS FROM THICKENING ABOUT A CHRONIC SIMPLE ULCER AND FROM SIMPLE HYPERTROPHIC STENOSIS OF THE PYLORUS—CASES OF THE FORMER.—II. TUBULAR AND SMALL NODULAR TUMOURS—SYMPTOMS—NON-MALIGNANT TUMOURS OF THIS REGION—INVOLVEMENT OF THE PYLORUS IN GALL-BLADDER ADHESIONS.—III. LARGE NODULAR GROWTHS 92

CHAPTER X.

STUDY OF THE TUMOUR (continued).

TUMOURS OF THE STOMACH WALL—GENERAL FEATURES—TUMOURS OF ANTERIOR WALL—TUMOURS OF POSTERIOR WALL—MASSIVE TUMOURS OF WALL—TUMOURS FOUND AT AUTOPSY, BUT NOT RECOGNISED DURING LIFE 104

CHAPTER XI.

THE BLOOD IN CANCER OF THE STOMACH.

PAGE

RED BLOOD-CORPUSCLES: COUNTS IN FIFTY-NINE CASES—HÆMOGLOBIN: ESTIMATIONS IN FIFTY-TWO CASES—LEUCOCYTES, WITH DIFFERENTIAL COUNTS—DIGESTION LEUCOCYTOSIS—CANCER OF THE STOMACH SIMULATING PERNICIOUS ANÆMIA 113

CHAPTER XII.

COURSE OF THE DISEASE—LATENT CANCER.

THE STATISTICS OF DURATION OF SIXTY-THREE CASES—CONDITIONS UNDER WHICH IMPROVEMENT OCCURS — ACUTE CASES — CHRONIC CASES—LATENT CARCINOMA OF THE STOMACH—THREE GROUPS OF CASES: (*a*) WITH NO LOCAL FEATURES, (*b*) WITH THE SYMPTOMS OF AN ASSOCIATED LESION, (*c*) WITH METASTASES WHICH MASK THE PRIMARY DISEASE 125

CHAPTER XIII.

PATHOLOGICAL ANATOMY.

POSITION OF THE GROWTH—PRESENCE OF ADHESIONS—ULCERATION—SIZE OF THE STOMACH—DILATATION—CONTRACTION—METASTASES—PERFORATION—SUMMARY OF THE CASES—PERITONITIS—ASCITES—JAUNDICE—TUBERCULOSIS—STATE OF THE LUNGS—CIRCULATORY SYSTEM—MISCELLANEOUS—CLASSIFICATION OF GASTRIC CANCERS—SECONDARY CANCER OF THE STOMACH 138

CHAPTER XIV.

TREATMENT.

IMPORTANCE OF EARLY DIAGNOSIS AND EXPLORATORY OPERATION—MEDICAL TREATMENT—DIET, STOMACHICS, LAVAGE—SPECIAL SYMPTOMS — PAIN, VOMITING, CONSTIPATION — SURGICAL TREATMENT: EXPLORATION, RADICAL OPERATION, PALLIATIVE OPERATIONS, GASTROSTOMY FOR CANCER OF THE CARDIA, GASTRO-ENTEROSTOMY FOR STENOSIS OF THE PYLORUS 148

CHAPTER I.

GENERAL ETIOLOGY.

CANCER IN GENERAL—QUESTION OF ITS INCREASE—HAS CANCER OF THE STOMACH INCREASED IN FREQUENCY?—STATISTICS OF CANCER OF THE STOMACH AT THE JOHNS HOPKINS HOSPITAL—SEX—AGE—RACE—CONJUGAL CONDITION—FAMILY HISTORY OF CANCER—TUBERCULOSIS—PREVIOUS STOMACH TROUBLES—ALCOHOL—MISCELLANEOUS CONDITIONS—TRAUMA—GENERAL CONCLUSIONS.

In presenting the subject of cancer of the stomach in some detail we feel that no apology is needed. Statistics vary as to which organ of the body holds the unenviable position as the one most often attacked by malignant disease; but however this may be, of internal cancer, not accessible to direct observation, that of the stomach is by far the most frequent and important.

While there has been a most gratifying decrease in the death-rate from the infectious diseases, sanitarians and statisticians have of late called attention to a marked increase in the mortality from malignant disease. Fortunately the question has aroused widespread interest, and even governments (State of New York) have been induced to make large appropriations for the study of the subject.

A glance through any recent volume of the *Index Medicus*, under the heading of Cancer, gives an idea of the enormous activity of different workers in all parts of the world. Pathologists and bacteriologists are seeking to discover the cause of the disease; clinical physicians are perfecting in every possible way the means of diagnosis, so as to secure a very early recognition; while the surgeons are daily widening the field of operative interference, and improving the technique of the older operations.

Since the organisation of the Johns Hopkins Hospital there

is no single affection which has received more careful study than cancer. The article by Professor Welch on "Cancer of the Stomach" in Pepper's *System of Medicine*, the most exhaustive in any language, appeared when the pathological laboratory was the only part of the hospital plant in working order. We may refer to the work of Flexner and of Gilchrist on the so-called cancer organisms, to the introduction by Halsted of an ideal operation for breast cancer, with which most remarkable results have been obtained, and in the gynæcological department to many observations on malignant disease of the uterus, on which subject Cullen, one of Professor Kelly's assistants, has published an elaborate monograph.

In the medical wards, where malignant disease in general is of relatively less importance, the stomach—the internal organ which perhaps takes first rank in frequency of attack—comes within our province. As will be mentioned later, our experience is unusually large for the size of the service, which is explained by the fact that the institution is a consultation hospital for a very wide area of country. We propose in this work to give the experience of the first nine years of the existence of the hospital.

The Increase of Cancer in General.—Before taking up the special subject in hand, it may be of interest to consider briefly the incidence of malignant disease in general. If figures can be trusted, the death-rate from cancer has greatly increased in all countries in which careful returns are made. Bryant,[1] who discusses the whole question in the Wesley M. Carpenter Lecture, 1894, concludes that the death-rate from malignant disease is constantly increasing. Roger Williams[2] estimates that the proportionate cancer mortality is more than four times greater than it was fifty years ago.

The census figures of the United States for the last five decades are as follows:—

Year.	Population.	Total Deaths.	Deaths from Cancer.	Cancer Deaths per 1,000 Deaths.	Cancer Deaths per 100,000 Living.
1850	23,191,876	323,023	2,088	6·5	9·0
1860	31,443,321	394,153	3,672	9·3	11·7
1870	38,558,371	492,263	6,224	12·6	16·1
1880	50,155,783	756,893	13,068	17·2	26·0
1890	62,622,250	875,521	18,536	21·1	29·6

[1] *New York Med. Jour.*, May 18th, 1895.

[2] *Med. Press and Circ.*, London, 1896, N.S., LXII., 232.

In the returns for 1880 there were 1,781 cases in which the cause of death was given as "tumour." If these be added to the above, the figure per 1,000 deaths is 19·6, and per 100,000 living 29·6. In 1890 there were 2,448 cases, which, if added, give figures of 23·9 per 1,000 deaths, and of 33·5 per 100,000 living.

In the Report of the Registrar-General for England and Wales for 1896 the cancer figures are arranged in groups of five years, from 1861 to 1895 inclusive. The death-rate from cancer per 100,000 living was as follows :—

Years . . .	1861-65	'66-70	'71-75	'76-80	'81-85	'86-90	'91-95	1896	1897
Death-rate .	36·78	40·38	44·56	49·36	54·76	63·16	71·22	76·4	78·7

In 1896 the death per 100,000 living was 76·4, in 1897 78·7. These figures show a constant increase during a period in which the death-rate from all causes has steadily fallen. The total death-rate was in 1861-65 per 1000 living 22·58, and in 1891-95 it was 18·73. The intervening periods show a steady decrease.

Our colleagues in Australasia have demonstrated the same thing. The mortality figures for Victoria[1] for the years 1870-84 show an increase at about the same rate as in England. Mullins[2] finds an increase from 1857 to 1893 in certain areas. MacDonald[3] points out the steady increase in the cancer mortality of New Zealand.

In the Registrar-General's Report for England and Wales for 1889, in discussing this question of increase, it is pointed out that the death-rate from cancer has risen more rapidly in males than in females, and that the increase has been greater and greater the more advanced the age. In 1851-60 the death-rate per 100,000 living was 19·5 for males and 43·4 for females; while in 1871-80 the rate was 31·5 for males and 62·2 for females. The increase was nearly general in all the organs affected. In the search for an explanation, greater accuracy in diagnosis is not considered adequate to account for the increase. But King and Newsholme,[4] in an article "On the Alleged Increase of Cancer,"

[1] *Austr. Med. Jour.*, Melbourne, 1887, N.S., IX., 99-101.
[2] *Austral. M. Gaz.*, Sydney, 1896, XV., 1-8.
[3] *N. Zealand M. J.*, Dunedin, 1889-90, III., 252; 1890-91, IV., 91-98
[4] *Proc. Royal Soc.*, London, 1893-94, LIV., 209-42.

consider that the apparent increase is largely due to more accurate diagnosis. They endeavour to prove that the increase is only in cancer of organs which are "inaccessible." The rate in accessible organs, in which the disease is easy to diagnose, they consider to have remained about the same. They claim that the statistics of Frankfort-on-the-Main, where records are kept as to the organs affected (from 1860 to 1891), show an absence of any increase in cancer in these parts. W. Roger Williams combats this view strongly, and sums up his conclusions in the following words: ". . . the uniformity in the variations of the increments of increase in the long accession of years; the fact that the increase has not been confined to one or a few parts of the body, but has involved them all—on the whole without any considerable disturbance of the normal proportionate ratios; the fact that the increase has been diffused over the whole country, instead of being limited to certain areas; and the fact that similar increase has taken place in most civilised communities where statistical records have been kept. These considerations, together with other facts, point conclusively to the reality of the increase in cancer . . . ." Welch[1] points out that the increase may be due to the decreased mortality in infants, and the prolongation of life by improved sanitary conditions. He also quotes the statement of Dunn[2] that the cancer rate of a country may be taken as an index of its healthfulness. Payne[3] combats the idea that the increase of cancer is only apparent, and holds that the explanation of improved diagnosis of cancer in the inaccessible organs does not account for it.

The interesting question of the geographical distribution of cancer is too large to be discussed here. The census returns of the United States for 1890 contain statistics and maps which bring out strikingly the variations of the cancer rate. Among these is the marked difference between certain areas in the northern and the southern states. Thus the figures for certain coast regions for 1890, per 100,000 living, are: For the South Atlantic coast region, 12; Middle Atlantic ditto, 21·9; and North Atlantic ditto, 34·7. In England marked geographical differences have been pointed out, and

[1] "Cancer of the Stomach," *Pepper's System of Medicine*, Vol. II.
[2] "Causes of the Increase in Cancer," *Brit. Med. Jour.*, 1883, I.
[3] *Lancet*, Sept. 16th, 1899.

Haviland says: "The cancer-fields of England are to be found in the sheltered and low-lying vales traversed by fully formed rivers, and having sites composed of the more recent geological formations."

Has cancer of the stomach increased in frequency?—To this question we find difficulty in presenting any positive answer from returns, as in a majority of these the cases of malignant disease are grouped together without any distinction as to the organ affected; and, frequently, the diagnosis of cancer of the stomach is of doubtful correctness. In the United States census the returns for cancer of special organs are only for certain areas, and so cannot be taken as representing an exact general conclusion. In the census returns for 1880, in certain groups, among 1000 deaths from cancer where the seat of the disease was known there were 300·18 from cancer of the stomach. The total deaths from this cause were 2133, which, in a population for the area of about 29,000,000, gives one death to 13,595 living. Certain areas in 1890 gave a rate of one death to 9,761 living.

Comparing the death-rate from this cause to the total deaths, Welch[1] estimates that in New York from 1868 to 1882 the ratio was about 0·4 per cent. If only the deaths over twenty years be taken the ratio is 0·93 per cent. In the census returns for 1890 in certain areas in which the stomach cancer death rate is given, its ratio to total deaths is 0·49, and to deaths over fifteen years is 0·87. If, however, one-third of cases of cancer of the liver[2] be added, the ratio is 0·56 to the total deaths, and 1·01 to deaths over fifteen years.

In the Report of the Registrar-General for England for 1889 figures are given for certain areas. The years 1868 and 1888 are taken for comparison. All cases of cancer of the generative and mammary organs in the female are excluded, and the death-rate is calculated for the population of thirty-five years and over. The death-rate per million living, of thirty-five years of age and upwards, from cancer of the stomach was in 1868—males, 283·65; females, 193·45. In 1888 it was—males, 346·15; females, 277·75. This is an increase in males of 22 per cent., and in females of 44 per cent.

[1] *Loc. cit.*

[2] Welch, in arriving at his conclusions, added one-third of the cases of cancer of the liver as secondary to gastric cancer.

The relative proportions of cancer of various organs should give some information. If, as King and Newsholme[1] argue, the increase is only apparent, and due to better diagnosis of cancer in the so-called "inaccessible" organs—of which the stomach is a good example—the relative death-rate of gastric cancer should show a marked increase in comparison with cancer of the uterus—one of the "accessible" organs (uterus, breast and tongue) which they consider is rarely overlooked. But this not the case: in fact, as the Registrar-General's report in 1889 shows, the increase of gastric cancer is rather less than that of cancer generally. The figures for the United States for the known areas in 1880 and 1890 are given in the following table. The 1880 figures are from 7,111 cases, and the 1890 from 9,657. With them are also given the figures arrived at by Tauchon[2] from 9,118 cases. The figures represent the number of cases among 1000 of all cancers:—

Organ.	1880.	1890.	Tauchon.
Stomach. . .	300·18	278·10	328·58
Uterus . . .	331·88	312·46	252·58
Breast . . .	151·07	115	217·26
Liver . . .	71·77	120	63·39

These rather scanty data do not justify a positive conclusion as to the increase of cancer of the stomach.

Cancer of the Stomach at the Johns Hopkins Hospital.—From its opening, May 5th, 1889, until March 31st, 1898, 150 cases were diagnosed as primary cancer of the stomach; of these 2 were cases of multiple primary cancer. During the same period there were 3 cases of secondary cancer of the stomach. Among the first 1000 autopsies in the hospital there were 40 of primary gastric cancer. The total number of admissions to the medical wards during this period was 8464. This gives a ratio of 1 case of gastric cancer to 56·4 admissions. Dr. Fitz has very kindly given us the figures for the Massachusetts General Hospital for the years 1889 to 1897 inclusive. Of 11,812 admissions in the medical wards there were 129 cases of cancer

[1] *Loc. cit.*

[2] "Recherches sur la Fréquence du Cancer," *Gas. des Hop.*, Paris, 1843, p. 313.

of the stomach—a ratio of 1 to 91·5. Dr. Wyatt Johnston has sent the figures for the Montreal General Hospital for a corresponding period. Among 9458 cases there were 54 of cancer of the stomach, a ratio of 1 to 175. These figures show a remarkable difference in three hospitals occupying almost identical positions in their respective communities. The figures of two of the large London hospitals may be given for comparison. At St. Thomas' Hospital during the ten years 1887 to 1896 there were 98 cases of gastric cancer among 18,958 medical admissions—a ratio of 1 to 193·6. At St. Bartholomew's for the same time there were 106 cases among 23,500 medical admissions—a ratio of 1 to 221·6. A certain number of cases of diseases of women were, however, treated in the medical wards. The large number of cases in our series is due in great part to the fact that this is a consultation hospital for a very wide area. During the same period, among 9565 admissions to the surgical wards there were 200 of cancer of the breast, a ratio of 1 to 37·8. And among 5370 gynæcological admissions (for a slightly shorter period) there were 221 of cancer of the uterus, a ratio of 1 to 24·3.

Etiology and Incidence.—Sex. There are varying statements as to the relative frequency in the two sexes. Thus Brinton considered the disease to be twice as frequent in males. Welch[1] among 2214 cases found 1233 males and 981 females. In a larger series of 5426 there were 2843 males and 2583 females. Reiche[2] reports the statistics from Hamburg for the years 1872 to 1898. During this period there were 4237 deaths from cancer of the stomach, of which 2387 were in males and 1850 in females, a proportion of 1·8 to 1. Of 772 cases of cancer of the œsophagus, 609 were in males and 163 in females, a proportion of 5·2 to 1. Of our series 126 were in males and 24 in females, a proportion of 5 to 1.

Age.—The following table shows the number of cases occurring in each decade in our series, and for comparison the percentages of Welch's table of 2038 cases and Reiche's Hamburg statistics.

[1] *Loc. cit.*

[2] "Beiträge zur Statistik des Carcinoms," *Deut. Med. Wochen.*, 1900, xxvi., No. 708.

Age.	Number of Cases.	Percentage.	Percentage of Welch's Table.	Percentage of Reiche's Table.
10–20	0	0	·1	·04
20–30	6	4	2·7	·87
30–40	17	11·3	13·3	5·85
40–50	38	25·3	24·5	14·15
50–60	49	32·6	30·4	25·94
60–70	36	24	21	32·16
70–80	4	2·6	6·8	18·13
Over 80	0	0	1·15	2·76

It is seen that the Hamburg statistics give the maximum figures in the seventh decade, and that in the earlier periods the percentages are less than in Welch's series. This was the case both in males and females. The large percentage of cases between the years 70 and 80 is striking. Of our cases below the age of 30, there was one each of the ages of 22, 24, 25, and 26, with two of the age of 28. The oldest cases in our series were two of 78. It will be seen that 57·9 per cent. were between the ages of 40 and 60.

In the census report for 1890, the death-rate from cancer of the stomach per 100,000 living in the registration areas is :—

All Ages.	15–45 Years.	45–65 Years.	Over 65 Years.
10·24	3·22	34·45	79·96

The large figure for the population over 65 years of age is of course due to the smaller number of persons living.

Race.—The relative numbers in the white and coloured patients were, white 131 and coloured, 9—a ratio of 6·9 to 1. The relative proportion in the hospital is about as 6 white to 1 coloured.

The question as to the occurrence of cancer among the coloured race is of much interest, especially in connection with the statement as to the infrequency of carcinoma among the negroes in Africa. In our coloured patients it is impossible to speak positively as to the amount of admixture of white blood.

The nationality of the patients is given in the table below, in

which the relative percentage of each nationality among the total admissions to the hospital is also given :—

Birthplace.	Cases in Series.	Percentage in Series.	Percentage of all Patients.
United States . .	86	57·3	78·3
Germany . . .	40	26·6	11·3
Ireland . . .	8	5·3	2·8
England . . .	6	4	1·4
Various . . .	10	6·6	5·4

Thus while the native-born supply 78·3 per cent. of all patients they supply only 57·3 per cent. of the cases of cancer of the stomach, and the 21·7 per cent. of foreign-born patients supply 42·7 per cent. of the cases. This is probably due to the fact that a very large percentage of the foreign-born are adults, and so supply a relatively large number of individuals in the "cancer-age."

The census returns in regard to colour and nationality are of interest. Thus in 1880 in the registration area the figures of deaths from cancer generally per 100,000 living were :—

White Males.	Coloured Males.	White Females.	Coloured Females.
20·54	5·85	35·44	19·32

This area contained a population of 29,000,000, of which 6,000,000 were coloured. The death-rate from all cancers per 100,000 living was for the whites 27·96, and for the coloured 12·67. As to nationality the rate per 100,000 living among the native-born was 20·08, and among the foreign born 53·30. Mullins[1] has noted the large ratio of deaths from cancer among the foreign-born population in certain parts of Australia. Those born in Britain, while only composing 23·5 per cent. of the population, furnish over 71 per cent. of the cases of cancer. The German born, who are only 0·85 per cent. of the population, furnish 3·4 per cent. of the deaths from cancer.

Regarding the deaths from cancer of the stomach in the registration areas, in 1890, the rate per 100,000 living for the white native-born is 5·84 for all ages, and 22·26 for the white

[1] *Loc. cit.*

foreign-born. A lower death-rate is found also in the children of mothers born in the United States, the highest being in the children of mothers born in Germany. This is most marked in the cases over sixty-five years of age, being 47·72 in children of native-born mothers, and 123·62 in the children of mothers born in Germany.

These figures indicate a lower death-rate from cancer in the coloured race as compared with the white, and in the white native-born as compared with the foreign-born.

The age, sex, and colour incidence are given in the table :—

Age.	White Males.	White Females.	Coloured Males.	Coloured Females.	Total.
20–30	4	0	2	0	6
30–40	9	5	3	0	17
40–50	29	5	4	0	38
50–60	36	6	5	2	49
60–70	27	6	3	0	36
70–80	4	0	0	0	4
Total	109	22	17	2	150

Conjugal Condition.—There were 137 married or widowed, and 13 single. In the census returns for 1890 the figures per 100,000 living of deaths due to cancer in regard to the conjugal relation were :—

Condition.	Males.	Females.
Single . . .	8	17
Married . .	16	100
Widowed . .	196	265

Family History.—In connection with this series, for the sake of comparison, the previous history of 150 cases of adults with the same relations of sex and colour was noted. These were taken at random among the medical cases, and are not intended to express any constant ratio. They are of interest, however, to compare with the cases of the series.

Statistics as to the relative frequency of a family history of cancer vary widely, from 1 in 3 to 1 in 28. Welch states that probably in about 14 per cent. it can be determined that other members of the family are or have been affected with the disease.

This estimate is based on an analysis of 1744 cases, in 243 of which a family history was determined. There were 11 patients, or 7·3 per cent., among our series giving a family history of cancer. Of these the special organs affected were: 2—one parent, cancer of stomach; 2—one brother or sister, cancer of stomach; 2—mother, cancer of uterus; 2—father, cancer of face; 3—sister, cancer of breast.

Among the comparative series there were 6 cases with a family history of carcinoma, one of these being of the stomach. Our figures do not support the statement that the disease developes at an earlier age when there is a family history of cancer. The following table shows the ages of the cases with a family history of cancer :—

Age.	Number of Cases.	Cases with a Family History of Cancer.
20–40	23	0
40–50	38	2
50–60	49	6
60–70	36	3
70–80	4	0

So that among the 23 cases which occurred below the age of 40, there was not one with a family history of cancer. The majority were among the cases in the decade with the greatest number of cases of cancer.

The influence of heredity is one about which widely different opinions are expressed. Certain exceptional cases of many members of the same family having had cancer—*e.g.*, the Bonapartes—have largely influenced opinion. Many of the French writers especially hold the view of an inheritance of cancer or of a tendency thereto, and in this sense use the term "la diathèse néoplastique." It is natural that in certain areas in which cancer appears to be common, as for example in Normandy, the occurrence of several cases in the same family should seem to support the probability of heredity. However, the Registrar-General's Report for 1889 points out (page xiv.) that as 1 out of 21 males and 1 out of 12 females who reach the age of 35 years die of cancer, it follows that on an average in 1 out of 3 cases either a parent or a grandparent will have died of this disease—if they died aged 35 years or over. Statistics

from private practice are likely to be of greater value than those gathered from hospital patients, who often know little about any but their more immediate family.

Tuberculosis.—There were 38 patients who gave a family history of tuberculosis, or 25·3 per cent. It is a coincidence that in the comparative series there were exactly the same number with a tuberculous history. The ages of these cases are given in the following table:—

Age.	Number of Cases.	Cases with a tuberculous history.
20–30	6	0
30–40	17	6
40–50	38	10
50–60	49	12
60–70	36	10
70–80	4	0

As in the patients with a cancerous family history, these do not apparently occur at an earlier age on account of the tuberculous family history. It may be stated that in 41 autopsies in this series there were tuberculous lesions in 11, of which 6 were old and 5 recent.

Lues.—Only 9 patients gave a history of syphilis.

Previous Stomach Trouble.—Until the appearance of Ewald's work on the stomach we had always held the view, based on nothing but vague impressions, that the subjects of chronic dyspepsia were much more prone than others to malignant disease of the stomach. In the present series this question has been inquired into with special care. It is of interest in connection with, first, the possibility of the development of a cancer on the site of a simple ulcer, and secondly, the supposed causal association between an acute or chronic gastritis and subsequent cancer.

In only four of our series was there a history which pointed to gastric ulcer, and in none of these could such a condition be positively diagnosed. In none of the autopsies was this condition found.

Thirty-three patients gave a history of stomach trouble before their present illness. Of these, 17 had isolated attacks—often many years before, and in some only single—which generally

seemed to have been an acute gastritis; 11 had chronic stomach trouble for some years, and in some it had existed during most of their life; 5 had stomach trouble, more or less constant, for one or two years before the present symptoms became pronounced.

It is interesting to note the incidence of stomach troubles in the series of hospital cases which we have taken for comparison. Twenty-eight of them gave a history of old gastric trouble; in 23 it had lasted for many years, while 5 of them had had also occasional acute attacks. This is a percentage not very much smaller than in the cancer series, so that we may conclude, so far as the figures show anything, that the victims of chronic dyspepsia and the various forms of gastritis are not more prone to malignant disease than other individuals.

Alcohol.—About one-half of the patients—77—had used alcohol regularly. Of these 8 were described as heavy, 65 varied from moderate to heavy, and 4 were light users. In the comparative series there were 65 who had been regular users of alcohol, of these 16 were heavy drinkers, 38 varied from moderate to heavy, and 9 were light users.

Miscellaneous Conditions.—Mental influences, as worry, strain, exposure and hardship, have been variously estimated as causal factors. Gallet and Deschamps,[1] in an inquiry into 722 cases of cancer, found that among 67 instances of cancer of the stomach, there were 44 giving a history of depressing mental conditions. Only isolated cases in our series suggested such a connection, and they are not numerous enough to be taken into account.

Local Irritation.—This offers a tempting field for investigation, but there are no specially conclusive facts to support such a view. Possible irritation from food or drink is urged by some writers. Thus in certain parts of Normandy, where cancer of the stomach is unusually prevalent, Brunon [2] and Rebulet [3] attribute this largely to the consumption of a special kind of cider made with sea water. As many of the cases occurred in the same family or in the same houses, these writers have also attributed an influence to heredity and contagion. The drinking of very

[1] *Presse Med. Belg.*, Brux. 1896, XLVIII., 225, 233, 241,

[2] Brunon, *Enquete sur le Cancer en Normandie.* Rouen: 1893.

[3] Rebulet, *Influence de l'Hérédité sur la Fréquence du Cancer en Normandie.* Paris: 1896.

hot strong tea has been advanced as a cause, and also the eating of large amounts of meat. There were not a sufficient number of cases in this series to show any causal agency in the previous food or drink.

Trauma.—Some writers, as Boas, lay a good deal of stress on this as an etiological factor. That an accident or injury should be sometimes regarded as the starting-point of the disease is not remarkable. In certain cases the malignant disease is latent, and the trauma is the factor which brings out the symptoms. When the onset is sudden this is likely to be mentioned as a cause. In several of the cases in this series an indulgence in very cold beer was referred to by the patients as a possible cause. In only a single instance in the 150 cases was there apparently a direct connection between the trauma and the onset of the disease. The following case illustrates the abrupt onset of stomach symptoms after an injury:—

A. S. (hosp. no. 24,713), aged thirty-nine, male; admitted Nov. 14th, 1898, complaining of pain, nausea, vomiting, and loss of weight. He had been a very healthy man, and had used alcohol freely. He was well and strong until January 1898, when he fell from a waggon, striking his back. He was unconscious for a time after the injury, but was up and about the next day. He had severe pains in the back, which radiated to both sides of the chest and abdomen, and have also continued to the present time. The day after the injury he noticed pain in the epigastrium, which was of a gnawing character, and which has troubled him until the present. He vomited the day after the injury (never before), and has continued to do so every day since. He brings up only food, never blood. He has lost over 50 lbs. in weight. He sank rapidly, and died on Nov. 30th. The post mortem showed a cancer of the pylorus.

General Conclusions.—Unfortunately, in the present state of our knowledge, we can only deal with the general etiology of cancer, whether of the stomach or of other organs. To pass from generalities is to enter a maze of speculation. In the consideration of the subject in hand there is nothing which throws special light on the obscure problem of the origin of the disease. The stomach is the hardest worked and most abused organ of the body, more subject also to irritation than any other, but it shares its unenviable position, so far as

frequency of attack, with two other organs, the breast and the uterus, which live lives of comparative idleness. The position of the cancer problem to-day is very much like that of tuberculosis in 1880. Who can say what a year may bring forth? and we must not despair even in this, at present, the most hopeless of all diseases.

CHAPTER II.

CANCER OF THE STOMACH IN THE YOUNG.

INTRODUCTION—CANCER OF THE STOMACH IN CHILDHOOD; ANALYSIS OF THE RECORDED CASES—CANCER OF THE STOMACH IN THE SECOND DECADE; ANALYSIS OF THE RECORDED CASES—CANCER OF THE STOMACH IN THE THIRD DECADE; REPORT OF CASES—PECULIARITIES OF CANCER OF THE STOMACH IN THE YOUNG.

Introduction.—Thirty years of age is a convenient dividing line below which we may consider cancer of the stomach as occurring in the young. The first three decades may be divided into two periods, one to the twentieth year, the second from the twentieth to the thirtieth year. Cases occurring during the first period are clinical and pathological curiosities. Those, however, of the latter period are of more interest, since, though a small fraction of the total cases, they comprise a fairly constant percentage and show fairly uniform symptoms. While writers of a generation ago, as Bamberger and Niemeyer, held that gastric cancer could be left out of consideration in the diagnosis of obscure cases in the young, later authors recognise the occurrence of a certain definite percentage at this period of life. In Welch's table of 2,038 cases the percentage was 2·8. Among 1,069 other cases[1] there was a percentage of 2·3. So that among a total of 3,257 cases there were 2·5 per cent. below the age of thirty years. In our series of 150 consecutive cases 6 of the patients were under thirty years of age—4 per cent.

I. Cancer of the Stomach in Childhood.—The extreme rarity of gastric cancer at this period is shown by the fact that there are only six cases on record below the age of ten years. The literature contains so many allusions to cases without a definite reference that there may be other instances than those

[1] Statistics of Kohler, 319; Ott, 444; Reichert, 70; Canstatt, 70; Hahn, 166.

here referred to. The same may be said of the cases between ten and twenty years of age. The reported cases in childhood have been subjected to criticism, and none can be positively accepted as arising after birth. It may be noted that Steiner and Neureutter[1] failed to find this condition among two thousand autopsies on children, although it was specially looked for.

The cases below the age of ten years are as follows :

1. **Thomas Williamson's case.**[2] It is curious to find that in nearly all the references to this case it is spoken of as "Wilkinson's." So often is this repeated that a reference to this case as "Williamson's" by Le Vaillaint was at first thought to apply to another case. This was in an infant apparently healthy at birth. In a few days vomiting and emaciation began. These continued, and death occurred at the end of five weeks. At autopsy, the pylorus was found to be hard and indurated, with the orifice so contracted as scarcely to admit a probe. The mucous coat was slightly thickened, while scarcely a trace of the muscular tunic was observable. The submucous tissue was much hypertrophied and indurated ; it seemed to be the only tissue between the mucous and serous coats. There is no note regarding the histological character of the growth. Doubt is expressed whether this was a case of cancer or of simple hypertrophy.

2. **Cullingworth's case**[3] was in an infant. Vomiting began when the child was ten days old. This, with constipation and emaciation, continued for twenty-nine days until death. Autopsy showed a much dilated stomach nearly filling the abdominal cavity. The wall was hypertrophied, especially toward the pylorus, from the surface of which a small pear-shaped tumour an inch long arose. This was soft and ulcerating. It completely filled the pyloric orifice. The growth was examined by Dreschfield, and proved to be a cylinder-celled epithelioma. Welch[4] considers that the tumour was probably congenital.

3. **Kaulich's case**[5] was in a child aged a year and a half, with an abdominal tumour, but whether primary or secondary in the stomach is not positively known.

[1] *Prager Vierteljahrschrift*, vol. lxxxix., p. 77.
[2] *London and Edinburgh Monthly Journal of Medicine*, 1841, vol. i., p. 23.
[3] *British Medical Journal*, 1877, vol. ii., p. 253.
[4] *Loc. cit.*
[5] *Prager med. Wochenschrift*, 1864, No. 34, p. 269.

4. **Kuhn's case.** This is referred to by Williams,[1] who considers it to be probably adeno-carcinoma of congenital origin.

5. **Widerhofer's case** [2] was in an infant sixteen days old, and was possibly secondary in the stomach.

6. **Ashby and Wright's case** [3] was in a child aged eight years, who was admitted to the hospital complaining of distention of the abdomen. There was neither vomiting, tumour, nor tenderness. Some months later there was tenderness, and a tumour was felt to the right of the navel. Pain was present. Death followed rapidly. Autopsy showed the duodenum, transverse colon, and stomach matted together. The stomach was dilated, its walls thickened, and the pylorus just admitted the forefinger. On the cardiac side of the pylorus were two small growths the size of peas, and on the duodenal side there was an irregular cavity, the walls having been destroyed by new growth.

Microscopical examination showed the growth to be columnar epithelioma. From the description it would be difficult to say positively that the growth was primary in the stomach.

Some resemblance to malignant disease of the stomach is borne by hypertrophy of the pylorus in infants, an affection which Thomson, of Edinburgh, has studied with special care. As already noted, Williamson's case is thought by many writers to have been simple hypertrophy. The course may be rapid and simulate malignant disease, as in a case reported by Pitt,[4] in which death occurred in seven weeks following continuous vomiting and emaciation. Rolleston and Hayne [5] have reviewed the reported cases, seventeen in number. An interesting case is reported by Batten,[6] at the age of eleven weeks, in which the stomach peristalsis was visible and the pylorus could be felt. Under careful feeding the child improved for some months, subsequently dying from broncho-pneumonia. Autopsy verified the diagnosis.

II. Cancer of the Stomach during the Second Decade.—This is of greater clinical interest, although so rare that we can find reference to or reports of only thirteen cases. The

[1] *Lancet*, 1897, vol. i., p. 1194.
[2] *Jahrb. f. Kinderheilk.*, alt. Reihe, Bd. ii., p. 194.
[3] *The Diseases of Children*, second edition, p. 99.
[4] *Transactions of the Pathological Society of London*, 1892, p. 63.
[5] *British Medical Journal*, 1898, vol. i., p. 1070.
[6] *Lancet*, 1899, vol. ii., p. 1511.

articles by Mathieu[1] and Maniage[2] on this subject are of much interest.

The cases may be spoken of in some detail.

1. **Norman Moore's case**[3] was a girl, aged thirteen years, who presented no special stomach symptoms, but vomiting occurred two days before death. At the autopsy a carcinomatous growth, measuring three inches in diameter, was found at the cardiac end of the stomach.

2. **Scheffer's case.**[4] A boy, aged fourteen years (in whom the diagnosis of neoplasm of the spleen was made), complained of anorexia and pain. Vomiting of food came on only twenty days before death. A tumour was present in the left hypochondrium. Death occurred after a history of nine weeks, and after the patient had been one month under observation. The autopsy report by von Recklinghausen was encephaloid cancer of the stomach.

3. **Jackson's case,** quoted by Welch,[5] was in a boy, fifteen years of age, in whom no evidence of disease existed until ten weeks before death.

4. **Lindner's and Kuttner's case,** quoted by Schiff,[6] was in a sixteen-year-old boy.

5, 6, 7, 8. **Cases of Koster,**[7] **Dittrich,**[8] **Landouzy,**[9] **and Boas.**[10]— These were all aged seventeen years. The first two showed scirrhus of the pylorus. In the case reported by Landouzy, although there was persistent vomiting without evident cause, with a tumour in the umbilical region, varying in position and character, the question of a gastric growth does not seem to have been considered. The age of the patient and the absence of pain apparently led to error. Death occurred after about seven weeks, The stomach was found dilated, with a scirrhous mass at the pylorus.

[1] *Du Cancer précoce de l'Estomac*, Lyon, 1884.

[2] *Essai sur les Tumeurs malignes des Enfants*, Paris, 1895.

[3] *Transactions of the Pathological Society of London*, 1885, vol. xxxvi., p. 195.

[4] *Jahrbuch für Kinderheilkunde*, Leipzig, 1880, vol. xv., p. 425.

[5] Extracts from the *Proceedings of the Boston Society for Medical Improvement*, vol. v., Appendix, p. 109.

[6] *Centralblatt für die Grenzgebiete der Med. u. Chir.*, Band i., No. 12.

[7] *Centralblatt für Chirurgie*, 1888, p. 372.

[8] *Prager Vierteljahrschrift*, 1845, Band viii., p. 116.

[9] *Bull. de la Société anatomique de Paris.*

[10] *Diag. u. Ther. der Magenkrankheiten.*

9, 10. **Cases of Hirtz**[1] **and Dittrich.**[2]—These were both at the age of nineteen years.

11, 12, 13. **Cases of Wilde,**[3] **Glynn,**[4] **and Dock.**[5]—These are all at the age of twenty years. Wilde's case was from the records of the Pathological Institute at Kiel. In it there was a large cancerous ulcer at the cardia. Glynn's case presented symptoms for three months. There was a tumour, apparently at the pylorus. At operation involvement of the glands was found, and it was abandoned. Death followed fourteen days later.

Dock's patient had suffered about a year with pain, difficulty in swallowing, loss of strength, ascites, and œdema. There was obstruction to the passage of the stomach tube and no test meal was obtained. The abdomen was tapped and 4700 cubic centimetres of fluid removed. In this were found many cells showing caryokinetic figures and atypical mitosis. Fluid was also aspirated from both pleural cavities. Jaundice appeared later. The diagnosis was malignant disease of the peritonæum, lungs, and pleura. At autopsy cancer of the stomach involving the pylorus was found. There was involvement of lymph glands, omentum, pancreas, liver, and bile ducts. The total duration of this case was slightly over a year.

Dock expresses the opinion that cancer of the stomach in early life frequently runs a slow course, and cites a case reported by Mathieu[6] in a man, aged twenty-five years, whose symptoms began three years before, but there is no proof that these were due to cancer during the whole period. While cancer of the stomach in a young individual may pursue a slow course, as at any other age, yet from the cases collected by Mathieu and from those in the present series under the age of thirty, the conclusion seems to be justified that it is more often a rapid and acute affair.

III. Cancer of the Stomach in the Third Decade.—The cases at this period are more numerous, and may present difficulties in diagnosis. The proportion—4 per cent.—in our series is unusually large. The six cases are reported somewhat

[1] Quoted by Williams, *Lancet*, 1897, vol. i., p. 1194.

[2] *Prager Vierteljahrschrift*, 1846, Band xiii., p. 167.

[3] *Ueber das Vorkommen des Krebses bei jugendlichen Individuen*, Inaug. Dissert., Kiel, 1892.

[4] *Lancet*, 1896, vol. ii., p. 1232.

[5] *American Journal of the Medical Sciences*, N. S. 113, 1897, p. 665.

[6] *Semaine médicale*, 1895, p. 225.

fully, since, apart from their age, they all showed features of interest, one of which was the rapid course of the disease. They are given in order of age.

No. 103.[1] *Rapid Course.*—W. S., male, coloured (hosp. no. 14,392), aged twenty-two years, admitted November 4th, 1895, complaining of nausea and vomiting. His family history was negative. He had been healthy previously, and gave a history of lues and alcohol in moderation.

Present illness began rather acutely four months before with pain in the epigastrium after eating. Nausea and vomiting came on later. The vomiting became more frequent, and on admission he vomited after every meal. Pain had been severe.

Examination showed emaciation, a dry and harsh skin, and very pale mucous membranes. In the left hypochondrium there was distinct resistance felt on deep inspiration, which was permanent. The area of stomach tympany after inflation was increased. The result of the test breakfast was as follows: Hydrochloric acid was absent and lactic acid was constantly present. The blood showed hæmoglobin 38 per per cent., red corpuscles 4,220,000, and white corpuscles 6,800.

Course.—He vomited frequently, usually soon after food. The temperature rose several times to 101° and 102° F., without any chill or discomfort. Despite some relief to the symptoms by diet and lavage he lost ground during his stay. On Dec. 23rd he was discharged. He was lost sight of, and his subsequent history is not known. The following note was made by Dr. Thayer:—"Despite the youth of the patient and the absence of palpable tumour, the history of sudden onset, the results of the test meals, and the grave anæmia appear to justify a diagnosis of gastric cancer."

No. 110. *Stomach Tumour with Secondary Growth in the Umbilicus.*—C. D., male, white (hosp. no. 15,722), aged twenty-four years, farmer, admitted April 7th, 1896, complaining of pain in stomach. His family and previous history were negative. He had never had any stomach trouble before his present illness, which began suddenly a year and a half before, with vomiting after eating. Pain was present in the epigastrium, and was at times very severe. Ten months before admission he noticed a tumour in the left epigastrium, which has increased in size and become very tender. Since the appearance of the tumour he has vomited every day. In spite of this his appetite has continued good. He has lost over 60 lbs. in weight.

Examination showed great emaciation, pale mucous membranes,

[1] The number given first is that of the case in the present series.

and a greatly excavated abdomen. In the left epigastrium, about midway between the costal margin and the navel, was a distinct prominence, which descended visibly on inspiration. On palpation a distinct hard mass was felt, which varied in consistence, and was somewhat tubular. It was very movable, and could be swung into either a horizontal or vertical position. On April 10th Dr. Osler noted slight peristalsis visible in the mass. It could be moved quite to the right of the middle line. Gurgling was evident in the mass. There was a tumour mass in the navel which was of stony hardness and could be grasped and moved. It was slightly tender.

The patient did not gain, the vomiting continued, and he was discharged unimproved. His subsequent history is unknown.

No. 94. *Rapid Course; Tumour; Operation; Death Three Months Later.*—A. B., male, white (hosp. no. 13,050), aged twenty-five years, admitted on June 16th, 1895, complaining of weakness and debility. His history was negative, and he had previously been well and strong.

Present illness began about eight weeks before, when his friends noticed that he looked yellow. Two weeks later he had a slight feverish attack, which kept him in bed for some days. The temperature did not rise above 102° F. He then had loss of appetite, and began to lose flesh. He went to New York, and there had an attack of diarrhœa. After this loss of appetite, occasional belching of gas, and a bad taste in the mouth persisted. There was no nausea or vomiting. For two weeks before admission he had lost weight rapidly—nearly 15 lbs. His physician discovered a mass in the abdomen, and for this he sought advice.

Examination showed moderate pallor, with some sallowness and emaciation. The thorax was negative. The abdomen was natural; but about two fingerbreadths below the ensiform cartilage there was a distinct elevation, which descended with inspiration and could be held down. After the drinking of fluid this was lower, and could be depressed almost to the navel. It was not painful. After inflation the stomach tympany reached nearly to the navel, and the mass was moved down and to the right. The test meal gave 80 cubic centimetres of liquid, which contained no hydrochloric acid, and gave a reaction for lactic acid. The blood showed hæmoglobin, 75 per cent.; red corpuscles, 3,996,000; white corpuscles, 8,500.

The following note was made by Dr. Osler:—"There seemed no question that this was a tumour of the stomach, and probably carcinoma. The great mobility, with varying conditions of fulness and emptiness of the stomach, seemed a very important point. Then the anæmia, the nausea, the failure of stomach digestion, the absence of free hydro-

chloric acid, and the presence of lactic acid, in spite of the fact that he had only completed his twenty-fifth year, point to carcinoma of the stomach."

Operation by Dr. Bloodgood on June 18th. At a distance of an inch and a half from the pylorus, there was on the lesser curvature a group of distended veins and a patch of reddening of the serosa, with a little puckering just at the curve. This corresponded to a solid, firm mass, which appeared to extend about an inch on the anterior curvature and farther back on the posterior wall, forming a mass fully the size of an orange. Small nodules were felt on the posterior portion of the stomach.

The patient recovered rapidly from the exploratory operation. He was up in two weeks, had a good appetite, and seemed in every way better. He left for the mountains just three weeks after the operation. During the summer he grew feebler, more emaciated, and died on Sept. 25th, 1895.

The whole course of the symptoms only lasted for four months. The operation for a time seemed to have a beneficial effect on the symptoms. This improvement after an exploratory operation is referred to elsewhere.

No. 121. *Rapid Course.*—J. P., male, white (hosp. no. 17,801), aged twenty-six years, farmer, admitted Nov. 6th, 1896, complaining of abdominal pain and vomiting. His family and previous history were negative. He had been healthy, and had worked out of doors.

Present illness began in June 1896, with severe pain in the abdomen. This came on after he had severely strained himself by lifting a heavy weight, when, as he said, "something had given way inside." This pain continued and became very severe. It was situated about the navel, rarely in the epigastrium. Vomiting came on soon after the onset, and was usually just after eating. Twice the vomitus contained blood. He was generally very hungry, and felt that he could eat a dozen times during the day. There had been very rapid loss of weight—about 70 lbs. in five months.

Examination showed great emaciation. In the left hypochondrium there was a firm mass which moved with respiration. It extended to the median line, showed intrinsic movements, and could be felt to contract and relax under the hands. The diagnosis of contracted stomach with rather general involvement was made. The special features of the tumour will be spoken of elsewhere under that heading. The blood showed hæmoglobin 82 per cent.; red corpuscles, 5,600,000; white corpuscles, 10,000.

The patient was discharged on Nov. 16th, somewhat improved. His further history was obtained from Dr. Primrose, of New Berne,

North Carolina. The mass increased rapidly in size, and an exploratory operation was decided on. However, the patient's condition was so bad that it had to be abandoned before the abdominal cavity was opened.

The emaciation became extreme, the vomitus was at times bloody and grumous, the pain became so severe that morphine was required, and death followed in Dec. 1896, after a duration of about six months. No autopsy was obtained.

No. 56. *Rapid Course; Secondary Growth in the Liver.*—A. W., male, coloured (hosp. no. 7,730), aged twenty-eight years, marble polisher, admitted July 17th, 1893, complaining of a "lump in the stomach." His family and previous history were negative with the exception of lues.

Present illness only dated back for a period of three months, when he first noticed a mass in the abdomen. Soon after this he lost his appetite and began to vomit. The vomitus was scanty and never contained blood. Pain also appeared which, though not severe, had been constant. The bowels had been loose. There had not been any jaundice. He had lost over 30 lbs.

Examination showed emaciation and pale mucous membranes. The thorax was negative. There was no jaundice. The abdomen was distended; the epigastrium showed an irregular nodular mass, the rounded prominences of which were distinctly visible. The lower border of this mass was within a finger's breadth of the right anterior superior iliac spine. It was hard and sharp, and could be felt to descend on inspiration. Numerous rounded prominences were felt. The liver dulness in the right nipple line began at the sixth rib, and extended a distance of 23 centimetres. The supraclavicular glands were not palpable. Test meals gave absence of free hydrochloric acid and the presence of lactic acid. "Coffee-grounds" was present once in the vomitus.

Death and Autopsy.—On August 2nd the patient complained of sudden abdominal pain, which was not specially localised. The general condition was that of collapse, from which he did not rally, and death followed in a few hours. At autopsy the stomach was somewhat dilated, with the pylorus imbedded in a mass of glands extending into the portal fissure and attached also to the colon. The stomach contained coffee-ground material amounting to about a pint. On the posterior wall, just within the pylorus, was a soft, fungoid mass, 8 by 5½ centimetres, with an excavated ulcer. The glands along the lesser curvature were involved. Sections showed the growth to be typically carcinomatous, with no tendency to adenoma. The liver weighed 6,200 grammes, and reached 18½ centimetres below the ensiform. The surface was studded with elevations which varied from

mere points to areas 6 and 7 centimetres in diameter. The liver tissue was largely replaced by neoplasm.

The duration of the disease in this case was about four months. It is striking that the symptoms first complained of were due to the secondary growth in the liver. It is an illustration of the class of cases in which the symptoms are largely those of the secondary growth, and in which the diagnosis of the primary seat may be impossible. But for the chemical findings and the vomitus it would not have been possible during life to have diagnosed the primary growth. The case further illustrates the latency of a stomach growth, and how much difference there may be between the duration of the disease and its symptoms.

No. 45. *Rapid Course; a Previous History of Gastritis.*—P. K., male, white (hosp. nos. 627, 1,184, and 6,532), aged twenty-eight years, labourer, admitted Jan. 3rd, 1893, complaining of pain in the abdomen, with loss of weight. His family history was negative. His previous history was of interest in that he had been twice admitted to the hospital, in 1889 and 1890, with acute gastritis. There had been an interval of nearly three years since his last admission, in which time he had been fairly healthy, without any stomach symptoms during the greater part of the time.

Present illness began about four months before admission, with pain and vomiting. The pain was confined to the epigastrium, continuous, and increased by pressure. His appetite had continued fairly good in spite of nausea and vomiting. He had steadily lost weight. and of late, with œdema of the legs, there had been shortness of breath,

Examination showed a very anæmic man with puffy eyelids. The thorax was negative. In the abomen, below the right costal margin in the parasternal line, was a mass which descended markedly with inspiration. It extended from the right nipple line to the middle line, and the fingers could be placed between it and the costal margin. Liver flatness did not extend below the costal margin. After inflation the mass was pushed over to the right. No peristalsis was visible. The blood showed hæmoglobin 30 per cent.; red corpuscles, 3,100,000; white corpuscles, 22,000. The test meals contained blood, showed absence of free hydrochloric acid, and presence of lactic acid.

The patient lost ground rapidly. His temperature was almost constantly elevated to 100° or 100·5° F. in the evening. He died on Feb. 23rd, 1893, after a duration of between five and six months. No autopsy was obtained.

Remarks.—In reviewing these cases two features stand out prominently—a striking abruptness of onset, and the acuteness of the course. In four out of the six the disease began with a sudden definite onset. Another (**No. 94**) gave a history of only six weeks' illness, and might be included under the same head. In the sixth case the enlarged liver gave the first indication of malignant disease. Comparing this group with the cases in the period of five years over thirty, no such acute onset was found in the latter. The opinion that cancer of the stomach in the young frequently runs a rapid course has already been spoken of. Mathieu[1] came to this conclusion after a study of the recorded cases. The cases of this series support this view. It may be noted that all of our cases were in males.

Certain symptoms may be spoken of in detail.

Loss of appetite was considered by Brinton to be a marked symptom in young individuals. Mathieu holds a contrary view, and in his collected cases found that in one-half of the cases this symptom did not appear until the last four or five weeks of life. In a quarter of his cases the appetite was retained until death. He considers that this view of the supposed common absence of appetite in the young has contributed to errors in diagnosis. He suggests, in explanation of the fact that appetite is so often retained, that the mucous membrane is but little changed. In our series there was no loss of appetite in three, anorexia was present in two, and in one the point was not noted.

Pain.—As in cases at all ages, a certain number are free from this symptom throughout. In our series only one was free from pain. In the others it was fairly severe.

Vomiting was also present in five of the cases. The patient in whom it was absent had also absence of pain.

Tumour was present in five cases, in one of which it was only found at autopsy, the enlarged liver having covered it during life.

Ascites was not present in any of this series. Among twenty-seven cases collected by Mathieu it was present in five, of which four were thought to be cirrhosis.

Fever was thought by Mathieu to be generally absent in the young. But three of our cases had fever, and a fourth gave a history of a feverish attack shortly before admission.

[1] *Loc. cit.*

Duration.—This is of special interest, and the frequent acuteness of the course in the young is borne out by our cases. Mathieu, in his series of nineteen cases in the young, estimates a mean duration of three months. In eleven cases out of nineteen the duration was within two months and a half, in six of the remainder it was within six months, and in the remaining two the course was one year. The minimum period was between five and six weeks. In our series the duration is known in four instances. None of these were over six months—two being this period and two being four months. Of the remaining two, one with a history of four months was lost sight of; but, as he had lost ground rapidly and did not improve under treatment, it seems probable that the duration would not be much prolonged. The sixth case gave a history of over eighteen months.

Two of the conclusions of Mathieu may be quoted :—

1. Cancer of the stomach below the age of thirty has generally a rapid progress of some months, and often ends suddenly by incidents more or less abrupt.

2. Early cancer is not latent—it is often overlooked.

CHAPTER III.

SYMPTOMS.

GENERAL; SYMPTOMS ON ADMISSION—MODE OF ONSET—ANALYSIS OF SYMPTOMS OF ONSET—TIME OF ONSET BEFORE ADMISSION—SYMPTOMS IN DETAIL—PAIN—VOMITING—VOMITING OF BLOOD—OFFENSIVE VOMITUS.

In a discussion of this part of the subject it is well to bear in mind the classical saying of Brinton that cancer of the stomach is "obscure in its symptoms." Of organs liable to cancer the stomach is the best example of the class to which the term *inaccessible* has been applied. In studying the disease, we must always be on the watch for unusual and unexpected features. From the typical case with anorexia, vomiting, tumour, loss of weight and strength, etc., there are all varieties to the latent form without a symptom directly referred to the stomach.

Symptoms on Admission.—Taking them up in detail, it is of interest to note those of which the patients complained on admission, as they give some guide to the main subjective features. Ten gave no complaint of any stomach symptoms. Of the remaining 140, 84 complained of pain, 46 of vomiting, 38 of dyspepsia,[1] 38 of loss of weight and strength—generally with some stomach symptoms—12 of tumour, 5 of anorexia, 2 of hæmatemesis, and a number of various other conditions such as dyspnœa, jaundice, etc.

The comparatively large number who complained of a tumour

[1] Under this term is included a variety of indefinite stomach symptoms, such as uncomfortable full feelings, sensations of weight or distress, belching of gas, waterbrash, etc. It seems a convenient term to use, despite its uncertainty.

and the small number who spoke of loss of appetite are interesting features.

Mode of Onset.—Usually spoken of as gradual, a surprisingly large number in our series gave a history of an acute onset. Of course, patients are often astray in their recollection of the early symptoms, and they readily forget previous slight symptoms, and only remember a sudden exacerbation which they report as the onset. In many cases the onset is referred to an indiscretion in eating or drinking. A previously healthy individual eats foolishly or drinks overmuch, and may have what is regarded as an acute gastritis, some of the symptoms of which may continue until the patient is seen. The taking of very cold liquids, especially cold beer, was given as the cause of onset in several cases.

There were 37 cases in which the onset might be termed *sudden*. Of these, in 26 the onset had been within a period of three months previously, in 8 the onset was three to six months before, and in 3 it was over six months. As 17 of these 37 cases died in the hospital, or shortly after leaving, the question is suggested whether there be not some connection between a sudden onset and a rapid course. Of the cases with gradual onset, in about half the onset was under one year previously, and in half over one year.

Some cases of sudden onset may be quoted:

No. 99.—K. S. (hosp. no. 13,618), aged 35 years, female, single, white; admitted August 17th, 1895, complaining of abdominal pain. Her family history was negative. She had always been healthy, with the exception of malaria. Her present illness was of four months' duration. She had a severe coughing spell, during which she vomited a large amount of clotted blood, and was so reduced that she had to remain in bed for one week. On getting about again she noticed a mass in the abdomen above the navel. Pain soon appeared, and has been persistent; jaundice also was present for a time, but has disappeared; œdema of the legs came on recently.

Examination showed the patient to be fairly well nourished. The abdomen was distended, and in the left hypochondrium was a ridgelike hard mass. While in the hospital she vomited large amounts of blood. Her condition grew worse, and she died on Sept. 5th, 1895. No autopsy was obtained.

In this case the whole course was about five months, but

the fact that a tumour was found at the very outset proves that the actual duration of the disease was much longer. A second case, with the rather unusual onset of hæmatemesis, may be given:

No. 135.—H. M. (hosp. no. 20,007), aged 63 years, male, white; admitted July 11th, 1897, complaining of pain in the abdomen and thorax. His family history was negative. He had always been a healthy man, and had never had any stomach trouble. Three weeks before admission, a few minutes after dinner he suddenly felt sick at the stomach and vomited. The first of the vomitus was the food he had eaten, but the latter part contained a large quantity of blood—mostly bright red, but also containing some dark clots. After this he was weak and had to lie down for a time. No tarry stool was noted. Pain came on at the same time, and had persisted. He had lost weight rapidly.

Examination showed a tumour in the epigastrium. The test meal showed absence of free HCl and presence of lactic acid.

A more common mode of onset is with severe pain. A case in point may be quoted:

No. 80.—P. R. (hosp. no. 11,115), aged 52 years, male, white; admitted Oct. 11th, 1894, complaining of pain. His family and previous history were unimportant. His present illness began four weeks previous to admission. While at work he was suddenly seized with severe pain in the epigastrium, so that he was "doubled up" and had to go home. The pain was in one place, in the epigastrium, and was very severe. It recurred several times during the day, and that night he vomited for the first time.

Examination showed a tumour at the pylorus. The chemical findings confirmed the diagnosis of cancer. At operation, gastro-enterostomy, a growth at the pylorus was found.

Analysis of Symptoms at Onset.—Pain was present in 48 cases, dyspepsia in 46, vomiting in 21 (of which 2 were the vomiting of blood), loss of weight and strength in 13, anorexia in 4, difficulty in swallowing in 3, tumour in 1, jaundice in 1. There were 13 cases in which there were no stomach symptoms at onset. It is a very unusual and remarkable circumstance that a patient should himself find (as the very first symptom) the tumour. With the case in which jaundice, from secondary

growths in the liver, was the first symptom, it illustrates the fact that the symptoms give no accurate idea as to the time a stomach growth has been progressing.

The symptoms of onset may simulate those of another disease, particularly pernicious anæmia; to this reference will be made elsewhere. Other patients first complained of ascites, jaundice, œdema, etc., which emphasises the fact that cancer of the stomach may begin with symptoms of a most general character.

The small number of cases in which loss of appetite was a marked symptom at onset is of interest in connection with the usual picture of the text-books, in which this feature figures so largely.

Time of Onset before Admission.—In 107 cases, in more than two-thirds, the onset was within one year previously. The figures for various periods are: over two years, 4; from eighteen to twenty-four months, 10; from twelve to eighteen months, 23; from six to twelve months, 39; from three to six months, 32; and under three months, 36; uncertain in 6. The number of cases with a history of less than six months is surprising. They are nearly one-half of the series—namely, 68. Many of these seem to have been of an acute type, as 32 of them died in the hospital or shortly after discharge. Hospital figures bring out the acute cases, which are more apt to seek aid earlier.

Symptoms in Detail.—The three most constant symptoms, pain, vomiting and tumour, were present in the following proportion:—Pain in 130 cases, or 86·6 per cent.; vomiting in 128 cases, or 85·3 per cent.; tumour in 115 cases, or 76·6 per cent.

Pain was the most constant symptom in this series. Only 20 cases, or 13·3 per cent., ran a painless course. Authors differ widely in estimating the percentage of cases without pain. Brinton gives 8 per cent., and Lebert 25 per cent.

Situation of Pain.—The patients frequently did not refer the pain to any localised spot, but to the "stomach" region. Only in a few cases was it confined to a small area. In 36 cases the pain was confined to the epigastrium, in 10 it was only in the lower abdomen, and in 11 it ran through to the back. In a few instances pain was felt only in the back. Is there any connection between the situation of the pain and the situation of the growth? A study of this symptom in 45 cases that came to autopsy does

not show any evident relationship between the two. The figures are given in the following table : –

Seat of Growth.	Number of Cases.	Number without Pain.	Number with only slight Pain.	Position of Pain when Present.				
				Epigastrium.	Epigastrium and Hypogastrium.	Left Side.	General Abdominal.	Hypogastrium.
Pylorus . .	26	5	5	13	2	1	0	0
General . .	6	2	2	2	0	0	0	0
Lesser curvature . .	4	1	0	2	0	0	1	0
Cardia . .	3	2	0	1	0	0	0	0
Posterior wall .	3	0	0	2	0	0	0	1
Greater curvature . .	3	1	0	2	0	0	0	0

Of the cases of growth at the pylorus there were six causing stenosis. In all of these pain was present, being severe in three and slight in three. There were various peculiar radiatory pains ; thus, in the case of growth at the cardia with pain in the epigastrium, it radiated to the right shoulder and clavicle.

Character of the Pain.—This showed much variation, from slight attacks to severe constant pain. There were only 14 patients who described the pain as being very severe, a proportion of these having taken morphia for it. In 38 cases the pain was rendered worse by food, and of these 10 came to autopsy. Ulceration was found in 7 of this number. The situation of the growth was pylorus in 6, general involvement in 3, and in 1 the posterior wall.

In a small number of cases the taking of food rather eased the pain ; only one of these came to autopsy, showing an ulcerated pyloric growth. In certain cases the pain was not influenced in any way by food. Of these 5 came to autopsy, and in all ulceration was found. The growth was at the pylorus in 2, and in the wall in 3 of these cases. There were 16 instances in which the pain was practically continuous, and of these 6 came to autopsy. All of these showed ulceration ; the growth was in the pyloric region in 4, and mural in 2.

Cases without Pain.—Of the 20 cases, 13 had absolutely no pain ; in the remaining 7 there was slight discomfort at times, but no pain. Of these 12 came to autopsy. Seven showed ulceration. The situation of growth was as follows :—Pylorus

in 5 cases—ulceration in 2 ; cardia in 2 cases—ulceration in 2 ; lesser curvature in 2 cases—ulceration in 2 ; general in 2 cases —ulceration in 1 ; greater curvature in 1 case—without ulceration.

In two of these painless cases an exploration was made. In both the growth was mural. Comparing the autopsy records with the clinical symptoms, it seems impossible to connect positively any symptoms during life with a special situation of the growth. The presence or absence of pain with various characters seems to occur with a tumour in any situation, with or without ulceration.

The preceding figures in tabulated form are :—

Pain.	Cases.	Autopsies.	Ulceration.	Situation of Growth.			
				Pylorus.	Cardia.	General.	Walls.
Absent . . .	20	12	7	5	2	2	5[1]
Slight . . .	42	12	7	10	0	2	0
Continuous . .	16	6	6	4	0	0	2
No relation to food .	9	5	5	2	0	0	3
Worse after food .	38	10	7	6	0	3	1

Vomiting.—In 128 or 85·3 per cent. vomiting was present. It is apparently not so frequent an early symptom as pain, 48 cases having pain at the onset, but only 21 having vomiting. There are no special characteristics connected with the vomiting of cancer of the stomach. In the large group of cases with dilatation the vomiting has much the same characters as in cases of dilatation from other forms of pyloric obstruction. The history of vomiting of large amounts at intervals of one or two days is characteristic. To obtain relief the patients frequently induce vomiting, and after the stomach is emptied they feel comparatively comfortable for perhaps twenty-four hours. There may be recognised in the vomitus food taken many days before. In one case corn was obtained which had been eaten four weeks before ! Portions of vegetables may be found almost unaltered. The opposite type of case, namely that with contracted stomach, may also give a suggestive history—as the vomiting comes on at once or soon after the taking of food, and the vomitus is usually small in amount ; or there is a history of vomiting

[1] Two cases added in which operation was done.

whenever more than a certain amount of food is taken—an attempt to take more than their capacity, being immediately followed by vomiting. There may be a history of a progressive diminution in this capacity.

In later stages of the disease, when the patient is reduced, the vomiting may be a process of gentle regurgitation rather than a forcible expulsion of the stomach contents.

In 74 cases the vomiting was frequent; in 37 fairly often, in 17 only occasional. Of the 74 cases with frequent vomiting 20 came to autopsy. Among these there was ulceration in 11. The growth was at the pylorus in 16, general in 3, and in 1 mural. Of the 27 cases with moderate vomiting, 11 came to autopsy. Ulceration was present in 10 of these. The growth was pyloric in 4, situated in the walls in 4, cardiac in 2, and in 1 it was general. Of the 17 cases in which vomiting was rare there were 3 autopsies. Ulceration was present in 2 cases; one of these was a pyloric growth, the other two were in the walls. In only 1 case was there continued peristent vomiting; this was a case of growth at the pylorus with stenosis.

From the autopsy and operation records an attempt was made to establish some connection between the situation of the growth and the character of the vomiting, especially in relation to early onset and to the influence of food. Among 27 cases of growth at the pylorus, vomiting was an early symptom in 15, of late appearance in 5, and absent in 5. In 2 cases the history was not clear. In the 3 cases of growth at the cardia vomiting was not by any means a prominent symptom. One case had marked difficulty in swallowing, with frequent regurgitation; one had occasional vomiting only as a late symptom, and in the third it was absent. Of the 6 cases of general involvement, vomiting was an early symptom in 3, came on late in 2 cases, and was absent in 1 instance. Among the 12 cases of growth situated on the walls, it was not marked as an early symptom. It was only present at an early stage in 3 cases, and in 2 of these vomiting only occurred at the onset and not afterward. In 3 cases it came on as a late symptom, and in 6 it was absent throughout. In no case of growth of the walls was it a very severe symptom.

The conclusion from these figures is that vomiting seems less marked, especially as an early symptom in cases of growth situated on the stomach walls.

As to food, it does not seem possible to draw any definite relationship between the situation of the tumour and the occurrence of vomiting at any given time after eating. In a fair proportion of cases with tumours at the pylorus it came on in from half an hour to an hour and a half after food. In the cases of general involvement vomiting usually took place at once after eating, and this sometimes only after more than a certain quantity was taken. But several cases of pyloric growth also gave a history of immediate vomiting. In some instances vomiting eased the pain. This was especially marked in cases in which the taking of food caused pain, or the pain increased gradually in severity until vomiting occurred or was induced, when immediate relief was experienced. Many of these patients were in the habit of inducing vomiting to gain relief. Of 21 cases in which vomiting eased the pain, 5 came to autopsy, and of these in 2 ulceration was present.

Cases without Vomiting.—Of 22 cases there were 11 that came to autopsy, and in 9 of these ulceration was present. This goes to prove that vomiting is not necessarily connected with the presence or absence of ulceration. In two other cases an exploratory operation was done and the situation of the growth determined.

The number of cases, with the situation of the growth and the number in which no vomiting occurred, are tabulated below :—

Situation of Growth.	Number of Cases.	Number of Cases without Vomiting.
Pylorus . . .	27	5
Cardia . . .	3	1
General . . .	6	1
Walls . . .	12	6
Total . .	48	13

The number of cases with growth in the walls is just one-quarter of the total number, but they contribute almost one-half of the total cases in which vomiting was absent.

These figures are of interest in reference to the positive statement sometimes made that vomiting is never absent when an orifice of the stomach is involved. Six cases out of thirty at the pylorus and cardia were free from vomiting.

The general figures regarding vomiting are as follows :—

Vomiting.	Number of Cases.	Autopsy or Operation.	Ulceration.	Situation of Growth.			
				Pylorus.	Cardia.	General.	Walls.
Frequent .	74	20	11	16	0	3	1
Moderate .	37	11	10	4	2	1	4
Occasional.	17	3	2	1	0	0	2
Absent .	22	13	9	5	1	1	6

Vomiting of Blood.—This occurred in 36 cases, a percentage of 28·1 of the number in which vomiting was present, and of 24 for the total number. The relative figures for the two sexes were males 30, females 6, which is fairly close to the relative total proportion. In two instances, as already noted, it was the first symptom. There is no special peculiarity associated with the vomiting of blood. The blood in 32 cases was dark and altered more or less, in 3 it was bright red, and in one case both occurred at different times. In 9 cases the amount was small, leaving 27 in which the hæmorrhage was fairly profuse. The occurrence of this symptom showed no regularity : in some it was only once and early in the course, in others and the majority, it was a comparatively late symptom and was often repeated. In some cases there was also the passage of altered blood by the bowels. In no case of the series was the hæmorrhage severe enough to cause death, although in several instances it caused fainting and collapse. In the case of some very emaciated patients it hastened the fatal termination. In a case recently in the hospital there was a history of sudden profuse hæmorrhage from the stomach some months before. The patient fainted and was found in an unconscious condition. During the next few days he was only partially conscious, and vomited blood several times. Blood was also passed by the bowels, and on regaining consciousness he found that he was blind. The loss of sight was permanent.

Some cases may be referred to.

No. 99. *Large hæmorrhages at onset and before death.* Case has been referred to as one of sudden onset with hæmorrhage ; did not vomit in the hospital until two days before death, when she vomited three times. The estimated quantity of blood was 750 c.c.

No. 104. *Hæmorrhages of large amount.*—J. K., aged 65 years. He gave a history of slight stomach trouble for two years, which had

been much aggravated in the last nine months. Three months before admission, while walking in the street, he vomited a large amount of blood, and had to be assisted home. Three days before admission, while at work, he had another hæmorrhage. He first felt weak and dizzy, and then suddenly vomited a large amount of fresh and clotted blood. While in the hospital there was no further vomiting of blood, but there was always a small amount in the test meals. At autopsy an ulcerated growth was found at the pylorus.

Only three of these cases with hæmatemesis came to autopsy. All showed ulceration. The growth was situated at the pylorus, cardia, and on the posterior wall in these cases.

Vomitus with offensive smell.—The vomiting of foul-smelling material with a peculiar, intense, indescribable odour occasionally occurs. It was present in one case of the series.

No. 147.—C. H. (hosp. no. 21,664), aged 58 years, coloured. The patient was brought to the hospital in almost a dying condition; he was much emaciated. The abdomen was hard and board-like, and nothing could be made out by palpation. He vomited frequently. The vomitus had an intense, horrible, penetrating odour, which filled the whole ward. The probability of cancer of the stomach with perforation into the colon was considered, on account of the character of the vomitus. The patient rapidly sank. At autopsy a sloughing carcinoma of the lesser curvature which extended to the omentum was found. On opening the stomach the same odour was present as the vomitus had during life.

This case shows that the vomiting of offensive material does not mean always communication with the bowels. Dr. Osler has reported two cases[1] with this horrible stench; in one, a patient with a diffuse large cancer of wall, the odour was foul and fæcal, and of astonishing power of diffusion; there was no autopsy. In the other the autopsy showed a sloughing necrotic cancer of the wall.

[1] *Lectures on Abdominal Tumours*, and *University Medical Magazine*, 1895.

CHAPTER IV.

SYMPTOMS—continued.

APPETITE AND DIGESTION—LOSS OF WEIGHT AND STRENGTH—EXAMINATION OF STOMACH CONTENTS — MICROSCOPICAL EXAMINATION — FEVER — ENLARGED GLANDS—BOWELS—URINE.

Symptoms relating to Appetite and Digestion.—In rather a surprising number the *appetite* was practically normal, though many of these complained that while the desire for food was present, the fear and knowledge of subsequent pain and distress restrained them. There were 26 cases in which the appetite was normal. Autopsies in 7 of these showed ulceration only in one instance—a growth at the cardia. The growths were situated as follows: 4 at the pylorus, of which 2 caused stenosis; 1 at the cardia, 1 general, and in 2 on the walls. There were 17 cases in which the appetite was moderate. Only 2 of these came to autopsy, both of which presented ulcerated mural growths. In two patients the appetite was increased, and they could—to quote their own expressions—"eat a dozen times a day"; this also in spite of the fact that both vomited frequently. A total of 68 cases had a decided anorexia. The special distaste for meat, so often referred to, was present only in a comparatively few cases.

Under the term "dyspepsia" may be grouped a large array of symptoms which are more or less common to all stomach disorders. Exception is taken to the loose use of this term when it may be merely a means of covering ignorance. But it is a convenient term for a number of symptoms, such as discomfort in the epigastrium, feelings of fulness and weight, belching of gas, etc. These symptoms in cancer are probably due to many factors—the disturbing effect of the growth itself, the fermentative changes made possible by stenosis and stagnation, ulceration,

and the secondary gastric catarrh so frequently set up. These symptoms are irregular in their course and extent; they are present to some degree in every case with stomach symptoms, and do not require any extended discussion.

Loss of Weight and of Strength.—These are very common symptoms, present in nearly every case, and not only in those with marked diagnostic features, but also in the majority of latent cases. The loss of strength cannot be measured accurately. It is usually gradual and progressive, and after a time compels the patient to give up his work. Yet there are some patients who preserve their strength and weight to a remarkable degree. In a patient at present in the hospital, in whom an exploratory operation showed almost general involvement of the stomach, there had not been any marked loss of either weight or strength. His symptoms had lasted for about six months.

There were 79 patients who could give accurate figures as to their loss in weight. Of these, 2 had lost less than 10 lbs., 11 between 10 and 20 lbs., 19 between 20 and 30 lbs., 20 from 30 to 40 lbs., 16 from 40 to 50 lbs., 5 from 50 to 60 lbs., 4 from 60 to 70 lbs., and 2 had lost over 70 lbs. In the patients who had lost from 60 to 70 lbs., the history in two dated back over one year; in the others it was less than one year. Of the patients who lost over 70 lbs., in one the whole course of the disease was about seven months; the other, in whom there was a growth at the cardia and obstruction to swallowing, lost over 100 lbs. The conditions under which gain in weight may occur will be referred to in discussing the course of the disease.

Examination of the Stomach Contents.—The importance of the results of the examination of the contents of the stomach in gastric carcinoma is very great, especially as an aid to the diagnosis of the disease at an early stage. The general methods of examination need not be spoken of here. In the majority of cases the Ewald test breakfast was given, and, unless otherwise stated, it is the one referred to.

There were 90 cases in which satisfactory information was obtained. Instances in which there was doubt as to the value of the findings are not considered. Information was obtained in some cases from the vomitus. In two cases nothing was obtained, as there was obstruction to the tube entering the stomach.

Information got by the Passage of the Tube.—In five cases

there was obstruction to the passage of the tube; in three of these this was overcome, and stomach contents were obtained. The cases in which the tube could not be passed are of interest.

No. 11. *Rapid Case, General Involvement of Stomach, Death.*—J. W. (hosp. no. 1,335), aged 55 years, male, admitted complaining of constant vomiting. The family and previous history were negative. His present illness began three months previously with vomiting, pain, and shortness of breath. He had difficulty in swallowing, and a feeling as if what he had eaten were stopped. He frequently brought up his food. Examination showed an anæmic, emaciated man. There was slight tenderness in the upper epigastric region. No tumour was felt on palpation. On attempting to pass the stomach tube, it was arrested at the entrance of the stomach, and could not be passed further. On withdrawing the tube, it contained a small amount of blood and some whitish masses, which, when examined, were apparently fibrous like like tissue. No carcinomatous structures were to be found.

On the patient swallowing fluid no deglutition murmur could be heard, and the fluid was regurgitated almost immediately. Further attempts to pass the tube were not successful. The patient gradually sank and died, after a total history of about six months.

Autopsy showed carcinoma of the stomach, with extension to and stricture of the œsophagus. The stomach was much contracted, and showed general involvement. The growth extended 7 cm. in the œsophagus, and there was almost complete obstruction 3 cm. above the cardia.

In the other case, **No. 121**, no stomach contents could be obtained. The vomitus showed absence of free HCl and the presence of lactic acid.

In three instances the tube could be passed beyond the obstruction, and stomach contents were obtained. In two of these a tumour was present, and probable general involvement of the stomach was diagnosed. In the third a tumour was at times thought to be felt, and the diagnosis was confirmed by the finding of a small mass of malignant tissue in the stomach tube.

Blood in the Stomach Contents.—This was present in 30 cases. In 24 of these it was on the tube or visible in the stomach contents, while in 6 it was only observed microscopically. The presence of blood is always a suggestive sign, especially if a soft tube has been used without undue force. Care should be

taken to exclude blood coming from the nose or throat. In only six of these cases was there a history of the vomiting of blood. In no case was there any large amount of blood obtained, or any severe hæmorrhage set up by the use of the tube. As a precaution, however, it is usually safer to withdraw the tube at once when any more than a small amount is passed through the tube.

Of these cases ten came to autopsy, and six of them showed ulceration. The amount of blood in the other cases was small. If the blood obtained be more than the shreds so common as a result of the excessive straining, it may be considered a suggestive symptom, or if it be persistently present microscopically in the stomach contents.

Amount and Character of the Contents.—The amount varied from a few drops to some hundred cubic centimetres. The importance of the amount is largely concerned with small quantities in contracted stomach, and large amounts with dilatation. The ordinary amounts vary within the usual limits. In connection with cases in which the amount is over the upper limits of normal, an important observation to be made is as to a progressive increase in the quantity. If the amount be greater on successive examinations, it speaks for a progressive loss of motility.

Hydrochloric Acid.—Among the 87 cases in which stomach contents were obtained for examination, there were 80 which showed a complete absence of free hydrochloric acid. The literature contains much on this subject, and varying importance is attached to this symptom. It is generally considered that the permanent absence of free hydrochloric acid occurs in a large majority of all cases of gastric cancer. Its presence in normal amounts speaks against a carcinoma, except in the cases where the disease has developed in a previous ulcer. Yet the fact must be kept in mind that in a certain number of cases it is present with gastric cancer. Vickery[1] has reported three cases from the Mass. General Hospital which occurred in the course of one year. In one case the diagnosis of simple dilatation was made on her first admission in the absence of a tumour, which, however, was present on a subsequent admission. In all three cases a good reaction for free hydrochloric acid was present, and in all the diagnosis was verified by autopsy.

[1] *Boston Med. and Surg. Jour.*, August 1897, p. 132.

The percentage of cases given by various authors—Boas, Hammerschlag, Schneider, Rosenheim—in which free hydrochloric acid is absent varies from 73 to 90. The percentage of cases in the present series is 92. Among 256 cases quoted by the above writers they were 86·3 per cent. without free hydrochloric acid. Adding the present series, among 343 cases, 89·7 per cent. showed the absence of free hydrochloric.

There were seven cases in which free hydrochloric acid was found in the stomach contents. One case in which the vomitus contained free hydrochloric acid may be quoted:

No. 82. *Rapid course, frequent vomiting.* — B. N. (hosp. no. 11,524), aged 39 years, male; admitted Nov. 29th, 1894, complaining of pain and vomiting. His history only dated back for four months, previous to which time he was very well. Stomach trouble began then, and has persisted; severe pain and constant vomiting have continued. He gave up work six weeks ago, and has been in bed for three weeks. He has lost 35 lbs. in weight during this time. Vomiting has been frequent; often the vomitus contains "coffee-grounds."

Examination showed a well-marked tumour, which was thought to be in the anterior stomach wall. The patient vomited frequently, and the examination of the vomitus showed: Dec. 1st, 200 c.c., no free HCl., no lactic acid; Dec. 2nd, 75 c.c., no free HCl., no lactic acid; Dec. 3rd, 150 c.c., very faint reaction for HCl; Dec. 4th, 150 c.c., very faint reaction for HCl; Dec. 5th, contained a considerable amount of blood, and gave a very marked reaction for free HCl.; Dec. 6th, contained blood, and gave a distinct reaction for free HCl.

The patient was discharged unimproved, and his further history is unknown.

Of the cases with free hydrochloric acid in the stomach contents, in all a tumour was present. The reaction in three cases was given very faintly, but was well marked in the others. One of these cases may be quoted:

No. 68.—B. C. (hosp. no. 9,507), male, aged 55 years; admitted March 27th, 1894. His history was negative, with the exception of rather heavy alcoholism. The present illness only dated back for five weeks. He had a good deal of pain. Vomiting was only in the early morning before breakfast. He had lost 40 lbs. in a short time. Test breakfast, March 30th, 15 c.c. Total acidity 45. Well-marked reaction for free HCl; no lactic acid.

The patient died on May 28th. Autopsy showed cancer of the stomach, with a growth on the posterior wall. In the centre of the ulcerated area was a perforation covered by adhesion.

In the seven cases the diagnosis can hardly be in doubt. In all tumour was present; two came to autopsy, and two died shortly after leaving the hospital. The symptoms in all seem to point almost positively to cancer of the stomach. It may be said that although in the large majority of cases free hydrochloric acid is absent, yet in a certain number it is present. The continued presence of hydrochloric acid, sometimes in large amounts, has been shown repeatedly in connection with carcinoma developing in a previous simple ulcer. Hemmeter[1] in discussing this matter states the number of reported cases as 28, and gives a full list of the literature. In none of the cases of this series that came to autopsy was this condition found.

The history in two of these cases—**Nos. 87** and **110**—suggests the possibility of a previous gastric ulcer. Both the cases which had shown free hydrochloric acid and which came to autopsy had perforation of the stomach: in one case—**No. 68**—it was covered by adhesions; in the other—**No. 113**—there were openings into the colon and duodenum. In neither case does the amount of destruction of the mucous membrane appear to have been very extensive, and in this may be partly the explanation of the continued secretion of hydrochloric acid.

The histological changes occurring in the mucous membrane have been described as, (*a*) simple catarrhal inflammation; (*b*) interstitial gastritis; and (*c*) atrophy of the glands. In certain cases quoted by Hammerschlag[2] in which the histological condition could be compared with the chemical findings, it was found that in cases of carcinoma in which hydrochloric acid was present there were very slight or no changes in the mucous membrane. But in cases where the hydrochloric acid and the ferments were absent and lactic acid present, there was found atrophy of the specific gland elements and substitution by cylindrical epithelium or fibrous connective tissue.

Digestion Power.—This has not been done in a large enough

[1] *The Diseases of the Stomach*, pp. 490 and 525.

[2] Hammerschlag, "Untersuchungen über das Magencarcinom," *Archiv f. Verdauungs-Krankheiten*, 1896, Bd. ii., Heft 1 and 2.

number of cases to be of any value. The method advised by Hammerschlag,[1] in which the amount of digestion is expressed in percentages, is very easily used in clinical work. The ordinary rough method advised gives little comparative information. Probably the figure of "albumen digestion" is of great importance, especially in early cases, but more numerous records are necessary before its exact value is known.

Lactic Acid.—The discussion as to the presence, formation and significance of lactic acid in the stomach contents occupies a large amount of the recent literature on diseases of the stomach. Many of the questions raised must yet be considered open. To review the question here is not possible. Schiff[2] has collected the figures of various authors; and among 109 cases in which lactic acid was found, 92, or 84·4 per cent., were cancer of the stomach. Among 268 cases of cancer of the stomach lactic acid was found in 197 instances, giving 73·5 per cent. In the present series there were 73 cases with records on this point. Among these lactic acid was found in 55, giving 75·3 per cent. In the remaining 18 cases, in which no lactic acid was found, hydrochloric acid was also absent.

The general view as to the value of the presence and absence of lactic acid in the diagnosis of gastric cancer may be summed up as follows,—its presence speaks strongly for the existence, but its absence has no weight in favour of the absence of cancer.

Regarding the determination of lactic acid, the test of Uffelmann is very satisfactory for clinical purposes. Emphasis may be laid on the importance of making the test with the ether extract. Only when thus done should it be considered of value. The objection is urged against the Ewald meal, that enough lactic acid may be introduced with the food to give the reaction. But, as Hammerschlag[3] points out, the amount introduced in bread is too small to give the Uffelmann reaction, although it may give the more delicate Boas test. A control experiment may also be done.

Negative Gastric Juice.—There were 18 cases in which no

[1] Hammerschlag, *Internationale Klinische Rundschau*, 1894, No. 39.

[2] Schiff, "Die Diagnose des Magencarcinoms," *Centrallblat f. die Grenzgebiete der Medizin und Chirurgie*, 1898, Band i., No. 12.

[3] *Loc. cit.*

reaction for hydrochloric or lactic acids was obtained. The reaction in 12 of these was acid, in 4 it was neutral, in 1 alkaline, and in 1 both neutral and alkaline at different times. A case of gastric cancer in which the stomach contents are always neutral is not common. It may be quoted.

No. 102.—J. M. (hosp. no. 14,324), male, aged 49 years, admitted Oct. 25th, 1895. He gave a history of illness for ten months with pain, vomiting, and emaciation. There was a large gastric tumour apparently involving most of the anterior wall. The stomach was not enlarged. During ten days four test meals were given, always with the same result. A small amount of clear odourless fluid was obtained, containing some macerated bread. The reaction was always *neutral.* No free hydrochloric or lactic acid found.

The case with varying neutral and alkaline juice was :—

No. 107.—R. B. (hosp. no. 15,236), admitted Feb. 15th, 1896. An exploratory section showed a large mass in the anterior wall of the stomach. Test meal on Feb. 17th gave 20 c.c. of fluid, reaction neutral. On Feb. 26th there was obtained 20 c.c. of fluid with a decidedly alkaline reaction.

Microscopical Examination.—This is of considerable importance, and should be carried out not only in the fresh but also in stained specimen. It is well to carry out a procedure similar to that as used with sputum—namely, to spread out the precipitate from the stomach contents between two plates of glass and examine against a dark background (or on a large glass pan with blackened under-surface). Any solid particles can readily be picked out and examined under the microscope. It is important in withdrawing the stomach tube to make pressure with the finger on the tube until it is completely withdrawn. This is of special importance in all cases where there is any obstruction to the passage of the tube, or when no contents can be expressed through it. Any material got from the tube or in the eye should be carefully examined. As noted already, in several cases we were able to thus obtain masses of malignant tissue. Special attention has been drawn to this point by Hemmeter, and in several instances since this series the diagnosis has been verified in this way.

In the fresh specimen there is nothing of special interest with the exception of the Oppler-Boas bacillus which is better recognised when stained. Some writers have laid emphasis on the occurrence of sarcinæ as against the presence of cancer, holding that in dilatation they occur only in simple and not in malignant cases. Sarcinæ were found in four of the cases of this series, and their presence cannot be regarded as of weight against a diagnosis of malignant growth.

In the stained specimen the presence of micro-organisms and their type are of interest. The most important organism is the Oppler-Boas bacillus, which appears to be closely associated with the presence of lactic acid. In the present series, unfortunately, there are not records in a sufficient number of cases to report regarding it.

Fever.—A majority of writers on cancer of the stomach refer to fever, especially to cases in which, with chills and subsequent sweating, the temperature may rise to 103° and 104°. In this series fever was observed in 74 cases, practically 50 per cent. There were 53 cases in which the temperature was normal, 5 in which it was practically normal except for one brief elevation, 9 with subnormal temperature, and in 9 the patient's stay was too brief to obtain any proper record. Of the 74 instances of fever, including both constant and irregular elevations, there were—in 23 cases elevation slight, below 100° ; in 20, elevation to about 100° ; in 18, elevation to 100°—101° ; in 5, elevation to 101°—102 ; in 6, elevation to 102°—103° ; in 2, elevation over 103°. There were 15 cases in which there was a fairly constant elevation of temperature. Of these there were 9 with a range from 99° to 100°, 4 were about 100°, 1 about 101°, and 1 about 102°. There were 3 additional cases with an elevated temperature lasting for some days. Eight cases showed an irregular up-and-down "hectic" temperature which was normal once a day. Among 12 cases with a sudden rise in temperature there were 8 without any chill or chilly sensation—of which 3 were 103° or over—2 had chilly feelings with an elevation to 100° and 102°, and 2 had definite chills with elevation to 103° and 104°.

In searching for the cause of this elevation in temperature, in one-half of the cases the autopsy records are of interest. The occurrence of ulceration and presence of metastases have both been suggested as causal factors. The temperature records and autopsy findings are given in tabular form :—

Temperature.	Number of cases.	Number of autopsies.	Ulceration.	Metastases.
Normal . .	53	14	9	9
One brief rise .	5	2	1	2
Subnormal . .	9	1	1	1
Below 100° . .	23	5	3	4
About 100° . .	20	6	6	4
100°—101° . .	18	6	5	6
101°—102° . .	5	4	3	4
102°—103° . .	6	3	2	2
Over 103° . .	2	1	0	1
Without fever .	67	17	11	12
With fever . .	74	25	19	21

These figures are against ulceration or the occurrence of metastases having a constant influence on the temperature. The percentage of these conditions is larger in the cases with fever, but so many occur among the afebrile cases that they cannot be regarded as invariable causes.

Among the 15 cases with constant fever there were 5 that came to autopsy; of these, 3 showed ulceration and 4 had metastases. Of the 8 cases that showed an irregular fever, "hectic" in character, 2 came to autopsy, both showed ulceration and 1 had metastases. Of the 8 cases that showed a sudden rise without any chill, 2 came to autopsy, both of which had ulceration and metastases. Of the 2 cases with chilly feelings and fever, one came to autopsy and showed ulceration but no metastases. The 2 cases in which there were chills with elevation to 103° and 104° are of interest. In one of these death occurred fourteen months after leaving the hospital. At autopsy a growth was found at the fundus. The second case died three weeks after leaving the hospital, and showed metastases in the liver. In neither case was there perforation.

The question as to the cause of the chills is interesting. In none of these cases did they appear to be associated with perforation. The occurrence of this with adhesions and formation of pockets of pus may cause chills, as in a case mentioned by Osler in his text-book. There were chills and fever for over six weeks; autopsy showed perforation and a pocket of pus. The temperature in the cases of perforation in this series may be referred to. There were six of these, and in none was any chill noted. In a case of perforation of the anterior wall with general peritonitis (**No. 52**) there was an irregular rise to 100° and 101° in

the evening. In three cases with the formation of a walled-off abscess cavity (**Nos. 8, 32,** and **92**), in two the temperature was practically normal with the exception of a slight rise to about 99·5°. In the third case (**No. 92**), where the left lobe of the liver was riddled by abscess cavities, the temperature was irregular, ranging to 100° and 101·5°, but for a week before death it was normal. In a case with ulceration into the colon and duodenum (**No. 113**) the temperature was normal or subnormal. In the remaining case (**No. 68**) where the perforation was covered by adhesions, there was an irregular elevation with an average of 99·5°, but for a week before death it was normal.

In the fatal cases where the temperature was noted at death it was subnormal in 16, normal in 13, and elevated in 7 instances.

Enlarged Glands.—The left supraclavicular glands were palpable in 22 cases and the left axillary in 5 cases. In 2 cases both the left supraclavicular and left axillary were palpable. The absence of palpable supraclavicular glands was noted in 54 cases. As pointed out by Riegel, this symptom is a valuable positive one, but its absence should not be considered as of any value against the presence of gastric cancer.

Bowels.—Constipation is common in gastric cancer. There were 92 patients with constipation, 45 in whom the bowels were regular, 12 in whom there was diarrhœa, and 1 with alternate diarrhœa and constipation. There is no agreement to be found between the position of the growth and the condition of the bowels. Growths on the walls and orifices were found with both conditions of constipation and diarrhœa. In 5 out of 6 cases of pyloric stenosis there was constipation. In the remaining case the bowels were regular.

Urine.—This was noted as free from albumen and casts in 65 cases. Albumen was present in 36, and albumen and casts in 34.

Mental Symptoms.—A certain degree of depression is frequently present, as might be expected from the nature of this malady. In only one case were there marked mental symptoms, which lasted for three months before death. Coma was not present in any case.

CHAPTER V.

ASSOCIATED AND SECONDARY SYMPTOMS.

PERFORATION; METASTASES AT NAVEL AND BENEATH SKIN OF ABDOMEN; JAUNDICE; ASCITES; ŒDEMA; OCCURRENCE OF THROMBI.

Associated and Secondary Symptoms.—These are various, and are of importance from the standpoint of diagnosis, as they are liable to obscure the original disease. In the case of the stomach, which is probably the most "inaccessible" organ, this is specially marked. First among these we may refer to

Perforation.—This occurred in 3½ per cent. of 507 cases collected by Brinton. It is probably of more rare occurrence than the same condition in gastric ulcer. In the present series it occurred in 6 cases, or 4 per cent. Of these in three instances a walled-off abscess cavity was formed; in one there was perforation and general peritonitis, in one the perforation was covered by adhesions, and in the remaining case there was perforation into the duodenum and colon.

The formation of a walled-off abscess cavity is a fairly common sequence of perforation. The process is gradual, and adhesions are formed. The question is of interest not only in regard to the perforations of slow progress, as in gastric cancer or ulcer, but also in the acute condition, as in typhoid fever. How much local peritonitis may be set up by the extension of the ulcer to the serosa before actual perforation? Cushing, in discussing the perforation of typhoid ulcers, suggests *a pre-perforative* stage, in which local peritonitis may be set up around an ulcer which is nearly through the serosa. Probably this always occurs in these slowly progressing ulcers. In one case of this series there was general peritonitis, for which no cause could be found except that ulceration had nearly perforated.

In three cases there was formation of an abscess cavity. They may be briefly referred to in connection with this condition.

No. 8. M. K. (hosp. no. 1,006), female; admitted March 22nd, 1890. The main symptoms were pain and gradual loss of weight and strength. Vomiting only three or four times. Bowels were regular. On examination the stomach was not enlarged, and no tumour was felt. There was no abdominal tenderness. The temperature was slightly elevated. On March 31st the patient suddenly developed dyspnœa, cyanosis, and precordial pain. She died in twenty minutes from the onset of symptoms.

Autopsy showed an embolus in the right coronary artery. The stomach showed an ulcerated growth at the pylorus; in the centre of this was a sloughing perforation into a cavity formed by the stomach and adherent pylorus.

No. 32. J. R. (hosp. no. 4,706); admitted Feb. 15th, 1892. His symptoms were principally those of obstruction of the cardiac orifice. His physical examination was largely negative. The abdomen was flaccid, and there was no tenderness. There were no chills, and his temperature was normal. On account of this obstruction he was transferred to the surgical side for gastrostomy on Feb. 27th. This was done; but he gradually sank until death on March 9th.

Autopsy showed the liver, spleen, stomach, and diaphragm all adherent. There was a cancerous growth at the cardia which extended 4 cm. into the œsophagus. The ulceration measured 9 cm. in diameter, and the upper part was gangrenous. This opened into an abscess cavity bounded by the stomach, liver, and diaphragm. The pancreas and spleen were also adherent. There were many metastases, and also an abscess in the recto-vesical cul-de-sac.

No. 92. L. W. (hosp. no. 13,015); admitted June 11th, 1895. The main symptoms were pain, vomiting (usually of undigested food), and loss of weight. Examination showed much emaciation. There was great tenderness in the epigastrium, and several small nodules were felt. There was much sensitiveness on palpation over the liver. On July 11th a marked friction rub was noted in the epigastrium. Death occurred on July 12th. There were no chills noted, and the temperature was irregular, frequently rising to 101°. For a week before death it was normal.

Autopsy.—On section there were numerous adhesions binding the liver to the diaphragm and the stomach to the liver. The colon and omentum were also adherent to the stomach. The left lobe of the

liver was densely adherent to the stomach, and was riddled with cavities containing stomach contents. The walls of the cavities had a dirty grey sloughing character, and were limited by a distinct membrane. The stomach showed an ovoid ulcer on the posterior wall. The base was pale, ragged, and necrotic, and communicated with the cavities in the liver by an opening 1·5 cm. in diameter. There was no general peritonitis. There were numerous metastases.

In these three cases there were very few symptoms pointing to the formation of an abscess cavity. The third case showed great sensitiveness over the liver, but no other symptom. There were no chills, and the condition in all may be termed a latent one.

The notes regarding the case with the development of general peritonitis unfortunately do not speak of the symptoms during the few days before death. There was a growth at the pylorus, and an ulceration extending for 10 cm. into the stomach. In this was a perforation 7 by 3 cm. There was general peritonitis. The case in which the perforation was covered by adhesions showed no marked symptoms. At autopsy, on the posterior wall, was an ulcer 1·5 cm. in diameter, in which was a perforation 3 mm. in diameter. This was covered by adhesions. There was no peritonitis.

The last case in which there was communication between the stomach and duodenum and colon may be quoted :

No. 113. H. C. (hosp. nos. 15,222 and 16,191); admitted May 25th, 1896. He had been in the hospital also in the previous February. His most prominent symptom was pain, which was usually very severe immediately after food. Vomiting usually followed this. The vomitus was usually the previously eaten food. Black material was occasionally vomited, which may have been blood. The bowels had been very constipated. The patient required morphia constantly while in the hospital for severe, almost constant, abdominal pain. He gradually sank and died on June 27th, 1896.

Autopsy showed the stomach, colon, duodenum, and pancreas bound together. To the pyloric end of the stomach the colon was adherent anteriorly and the duodenum posteriorly. There was ulceration in the pyloric region 5 by 6 cm. There were two perforations opening into the colon and duodenum, each about the size of one's thumb. The margins of both openings were firm, indurated, and covered by grayish granulations. There was no general peritonitis.

In this case the usual signs of gastro-colic fistula were lacking. The vomitus presented no special features, and there was no diarrhœa. The vomiting of foul fæcal-like material occurred in only one case already noted, in which there was sloughing of the growth but no fistula.

Metastases at Navel and beneath Skin of Abdomen.—The occurrence of umbilical metastases in tumours of the stomach has been recognised for many years, though it is not often mentioned by the systematic writers on cancer of the stomach, not even by Welch, whose article, so often referred to, covers almost every detail. In his monograph on diseases of the stomach, Bouveret gives a short description, and gives credit for the discovery of the connection to Wickham Legg. In two or three Paris theses the condition is discussed, by Catteau (1876), by Villar (1886), and by Neveu (1890), whose monograph, entitled *Contribution à l'Etude des Tumeurs Malignes Secondaires de l'Ombilic*, is the only one specially devoted to the subject. Apparently the late Professor Damaschino, in 1879, sought to establish the relationship between secondary cancerous tumours of the umbilicus and malignant disease of the stomach. His comments on the subject appear in Villar's *Thesis*, 1886.

Wickham Legg,[1] in a paper on certain abdominal tumours, describes *cases of hardening of the linea alba and umbilicus*. He describes the condition as follows: "The patient applies for some such symptom as vomiting or jaundice; the belly is therefore examined, and on palpation the umbilicus is not found markedly prominent, but hard and firm, and the skin around is adherent; or there is no change in the umbilicus itself, but the linea alba may be felt as a hard cord passing from the umbilicus to the pubes, or from the xiphoid cartilage to the umbilicus as well. In some healthy persons there may be felt in the linea alba, between the pubes and umbilicus, a certain thickness or firmness, which is not, however, very marked. In the cases in which I have seen this cord-like appearance in disease it could not be mistaken for the natural linea alba, or for the remains of the fœtal vessels in the neighbourhood of the umbilicus, as it came down below the top of the bladder, and appeared to be attached to the symphysis pubis." He describes two cases. In one, a man aged forty-two, with cancer of the stomach and secondary involvement of the peritoneum, there was a hard line

[1] *St. Bartholomew's Hospital Reports*, 1880, vol. xvi.

which reached from the pubes to the ensiform cartilage, and post mortem the linea alba in this situation was found an inch in thickness, the new growth having its seat apparently in the subperitoneal tissue. The navel itself apparently was not affected. In the second case, also cancer of the stomach in a man aged fifty-four, the navel was hard and contracted, and to the right of it beneath the skin there was a hard nodule. After death the umbilicus and a line from it to the symphysis pubis was indurated, and there were a few white specks along it. It is not stated whether the peritoneum was involved.

In the *Transactions of the Tenth International Medical Congress*, Bd. III. 122, there is a paper by Mr. Morris, of New York, on "Malignant Disease of the Navel as a Complication." The paper is evidently written by the surgeon, Dr. R. T. Morris, though there is no indication whatever in the index or in the text other than that given above. He reports four cases, two of which occurred in his own practice. Both of these are of interest from the fact that the umbilical tumour was removed. In one case a woman of seventy had cancer of the pylorus and a secondary growth in the navel. In the other case a man aged fifty-four had a cystic tumour in the left groin and a secondary fungating mass at the navel, which was removed, and at the same time an exploratory laparotomy was made, which showed a colloid cancer of the omentum. Of the other cases referred to, one was a patient of Grinnell's, of Burlington; a man of sixty-eight, with cancer of the liver, had a firm, hard, indurated mass at the navel, and in the other instance, reported by Dr. Lewis, a woman with sarcoma of the uterus had secondary malignant disease of the sac of an umbilical hernia. Doubtless a more careful search of the literature would show that the condition is not very uncommon.

In a majority of the cases the affection of the navel has been associated with secondary disease of the peritoneum, but in other instances this membrane has, either post mortem or by laparotomy, as in Morris's cases, been shown to be free, so that we must suppose the secondary infection to have taken place through the blood current.

The first case to call our attention to umbilical metastasis was a very remarkable one :—

A young man, aged about thirty, was admitted to the private ward

with jaundice, believed to be catarrhal. His general condition was good, and he had not lost much flesh. Examination of the liver and of the abdominal organs was negative, and though the jaundice was rather deeper and more enduring than usual in simple catarrh of the duct, yet under all the circumstances this diagnosis was made. On the very morning of his departure, as the final note on his condition was being dictated, a nodular tumour, the size of a large pea, was noticed in the left side of the navel. It was so hard that a secondary growth was suspected. On removal Dr. Councilman pronounced it to be a scirrhus. This, of course, altered entirely our idea of the case, and the serious character of it was demonstrated six or eight months later, when the patient died of cancer of the pancreas.

In this series two cases of secondary growth at the navel were met with. There were three other cases with small nodules at or near the navel, the nature of which was doubtful. Two other cases have been seen by Dr. Osler in private, one of which with **No. 110** was made the subject of a clinic in April 1896. In **No. 110** the tumour was extensive, of stone-like hardness, involved the entire ring, and at one part was a little red and tender. Multiple subcutaneous metastases are occasionally seen in cancer of the abdominal organs. No case occurred in this series. An unusual case was seen by Dr. Osler, of which the following is a brief abstract :—

A. B., aged forty-four, seen with Dr. Shepherd, of Montreal. The mother had died of cancer of the breast, and a sister had died at the age of thirty-four of cancer of the stomach.

The patient, an active business man, had lived freely. In the spring of the year, about February or March, he began to feel ill, and had morning vomiting and nausea. The stomach trouble persisted, with loss of weight and strength. Within a month the local symptoms had become much more marked. He had had ascites, and had to be tapped twice. The stomach was seen to be greatly dilated, and the outlines could plainly be seen far below the umbilicus. There was visible peristalsis, and an ill-defined tumour mass could be felt to the left of the navel. There was a good deal of brawny induration, as though the abdominal wall itself were thickened.

The patient was emaciated. The abdomen looked moderately full; the respiratory movements were confined chiefly to the central part; the upper half of the navel was prominent and reddened. As he drew a deep breath, or as the skin was stretched, innumerable small subcutaneous nodules were seen, varying in size up to three or four

millimetres in diameter. They were most abundant in the epigastric region. They were also seen in the flanks, a few in the inguinal regions, and a few in the lateral thoracic regions. On palpation they were firm and shot-like. The navel was firm, hard, indurated, not tender. The upper half of it was much enlarged, and the ring seemed infiltrated. The superficial lymphatic glands were nowhere enlarged. Post mortem there were found cancer of the pylorus and secondary disease of the peritoneum with numerous subcutaneous metastases.

Jaundice.—This was present in 6 cases, in one of which it was the first symptom. Two of these came to autopsy; in one there was a solid carcinomatous mass in the common bile duct half a centimetre in diameter. The gall-bladder was enlarged, tortuous, and 14 cm. in length. No bile could be squeezed through the duct, and the bile ducts were enormously enlarged. In the second case the liver was largely composed of cancerous nodules varying in size from a pea to a pigeon's egg.

Ascites.—This was present in 8 cases, in 2 of which it was only slight in amount. It may conceal completely the seat of the primary trouble, and in the absence of stomach symptoms the diagnosis may be totally wrong. Careful examination should be made after tapping for the presence of a tumour. The presence of a hæmorrhagic fluid is of course suggestive of malignancy. The fluid should be allowed to stand for some hours and the lower portion centrifugalised.

Of the cases in this series 6 came to autopsy. Of these, in 4 there was secondary growth in the peritoneum, but none in the liver. The total number of cases with secondary growth in the peritoneum was 11. The 2 remaining cases showed secondary deposits in the liver, but none in the peritoneum. The total number of cases with secondary deposits in the liver was 23. So that out of 11 cases with secondary peritoneal growth ascites occurred in 4, and among 23 of secondary liver growth ascites was present in 2. The fluid varied from serous to hæmorrhagic in the various cases. In only one case were special cells found in a hæmorrhagic exudate, which resembled very closely masses of cancer cells. At autopsy implantation metastases were found on the peritoneum. No cells showing mitosis were found, such as are described by Dock in the article already referred to.

Œdema.—This was present in 12 cases, as a prominent condition. In all but three this was present in both legs. In three it was only in the left leg. The anæmic condition is probably a frequent cause.

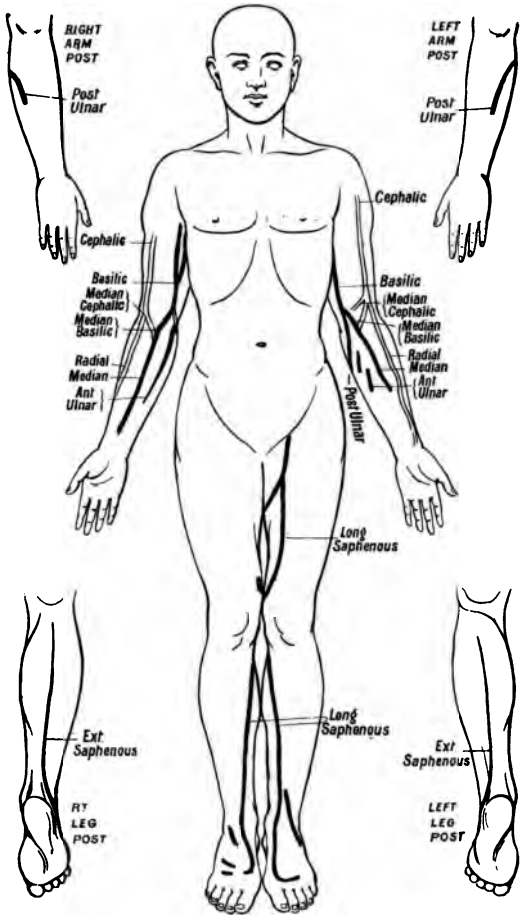

FIG. 1.—Showing multiple thrombi in the veins, with latent cancer of the stomach.

General œdema was present in **Cases 22** and **73**; which were latent, and are given in full in another section. In both cases the anasarca was regarded as renal in origin. In a case seen with Dr. Baltzell, of Frederick, the œdema was universal, but

the history and the intensity of the gastric symptoms enabled us to reach a diagnosis.

Thrombosis.—Thrombi were present in the left femoral vein in 2 cases, one of which came to autopsy. Post mortem they were found in 3 cases. An opinion of Trousseau in regard to thrombosis may be quoted:—"Should you, when in doubt as to the nature of an affection of the stomach . . . . observe a vein becoming inflamed in the arm or leg, you may dispel your doubt and pronounce in a positive manner that there is cancer." The marantic condition produced is probably the cause of the thrombosis.

The most remarkable case of general thrombosis was presented by **No. 64**; the history is given among the latent cases. As shown in the annexed figure (fig. 1) there were thrombi in some fourteen or fifteen veins.

CHAPTER VI.

STUDY OF THE TUMOUR.

GENERAL CONSIDERATIONS—INSPECTION OF THE ABDOMEN—MOBILITY OF GASTRIC TUMOURS—RESPIRATORY, COMMUNICATED, INTRINSIC AND MECHANICAL—ILLUSTRATIVE CASES—INFLUENCE OF INFLATION.

So important are the many features presented by a tumour in this disease that we shall consider them in some detail.

Incidence.—In 115 cases (about 76 per cent.) a tumour was recognised during life.

Position.—Epigastric region, 48; umbilical, 25; left hypochondrium, 18; right hypochondrium, 17; descended from beneath the left costal margin, 7.

Into the systematic details of the methods of examining the stomach we do not propose to enter; but there are two points to which particular attention may be called—viz. the value of inspection, and mobility in gastric tumours.

Inspection.—The value of a very careful visual study of the abdomen in cases of cancer of the stomach is illustrated by the fact that in 88 cases important information was gained in this manner. In 62 cases a definite mass was visible; in 14 there was prominence or fulness; in 12 peristalsis only was the prominent feature on inspection (in 10 of these 12 no tumour was visible, but was felt on palpation; in the remaining 2 the tumour was only found at autopsy). To inspect the abdomen it is necessary that the light should be good, and that the patient should be sufficiently exposed. One day at the Montreal General Hospital a consultation of members of the staff was held upon a doubtful case. Several physicians had examined the patient without finding anything. When the turn came of the late Dr. George Ross, he tucked up the patient's shirt, which heretofore had not been above the costal margin, and after looking for

a few moments, he requested the patient to draw a deep breath, when a tumour became visible quite plainly below the left costal margin. In reality this is not a very infrequent experience.

In the epigastric and umbilical regions of a healthy person nothing is seen beyond the normal respiratory movements and the communicated pulsation of the abdominal aorta, sometimes the pulsation of the heart in the left costo-xiphoid angle. On the other hand, when the abdominal walls are very thin, either as a result of a general wasting, or a local atrophy from repeated stretchings of the abdomen in pregnancy, the outlines of the viscera themselves may be visible. In a patient with extreme enteroptosis, not only may the thin edge of the left lobe of the liver be seen moving up and down with the respiratory movements, but the notches of the organ may be plainly visible. Occasionally the shadowy outline of the pylorus may itself be seen descending a little to the left of the middle line. In the case of Miss A., aged 28, weighing 93 lb., the abdomen was very relaxed, and the pylorus was readily palpable, and presented distinct contractions at intervals, through which one could feel and hear the gas bubbling. Its shadowy outline was plainly to be seen. At intervals the coils of the small intestine were visible, and the transverse colon, with its sacculations.

Even the outlines of the abdominal aorta, with its bifurcation, may be seen. Of this we have a photograph in an instance of extreme emaciation in anorexia nervosa, and we shall also refer to it as visible in a case of cancer of the pylorus.

Tumours of the abdominal wall itself are by no means uncommon—small lipomata or fibro-lipomata in the epigastric and umbilical regions. Still more frequent in the linea alba, often situated exactly in the position of tumours at the pylorus, are the pro-peritoneal herniæ, consisting either of a small nodule of fat, or a bit of omentum, or, in larger ones, a portion of the gut itself. These rarely offer any difficulty, as they are felt to be more superficial, and on inspection it is noticed that they do not descend with inspiration. Abscess in the recti muscles may cause a prominent swelling, but this is easily distinguished from an intra-abdominal tumour.

Mobility of Tumours of the Stomach.—Under this we may consider somewhat fully the changes in position and shape which a tumour of the stomach may undergo. The question is one to which we have paid very particular attention during the past few

years, and we can warmly commend the study as one particularly helpful in diagnosis, and we urge this the more strongly, since in recent monographs on diseases of the stomach the point has not been dwelt upon with the fulness it deserves.

I. **Movement with Respiration.**—In 52 of the cases the tumour was seen to move visibly with respiration ; in 69 cases the tumour moved with respiration either on inspection or palpation. Of the 69 cases in which this movement was determined, 13 came to autopsy. Of these 9 showed the presence of adhesions between the tumour and adjacent parts ; 4 had no adhesions.

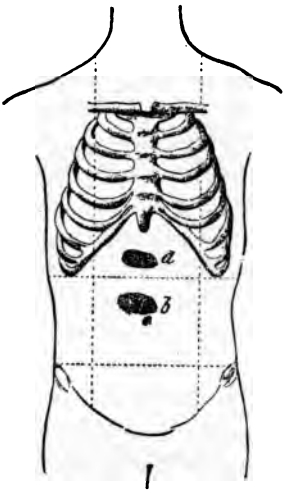

FIG. 2 (Case No. 51).—*a*, position of the tumour in expiration ; *b*, in inspiration.

In a large proportion of all the cases in which a tumour of the stomach is visible it follows to some extent the respiratory excursion. The movement may be visible only as a well-defined shadowy outline in the epigastric region. In other instances a prominent nodular mass appears beneath the costal margin on deep inspiration. Much depends on the method of inspection, and on the proper degree of illumination. A good side light, or light from behind the observer, is all-important. The extent of respiratory excursion is variable. It may not be more than an inch, but in extreme cases it may be as much as five or six inches, as shown in fig. 2. from No. 51.

II. **Communicated movement from the Aorta.** Of the 88 cases with visible movement, 21 showed also communicated pulsation from the aorta. Usually in the left half of the epigastric region and in its lower part, this may be the special feature to attract the attention of the observer. More than once it had been mistaken for the pulsation of an aneurism. Occasionally

FIG. 3.—From a photograph, showing undulatory waves of peristalsis. The crosses are placed on the three prominent waves. The letter indicates the depression on the lesser curve.

the impulse is remarkably defined and punctuate, more frequently it is diffuse and occupies a larger area to the left of the middle line than in the " throbbing " aorta.

III. **Intrinsic movements of the Stomach.**—Thirty-six cases showed vermicular movements of the stomach wall or of localised portions of it. In a majority of the cases there was peristalsis, causing wave-like protrusion of the abdominal wall, as shown so

well in fig. 3 from a photograph. Certain cases showed irregular movements of alternate rapid protrusion and flattening. One of the most remarkable of these has been reported, and the following paragraph is quoted. "The tumour mass in the abdomen appears and disappears, occupying a position to the left of the median line. The variations in it are very striking. As it contracts and becomes hard it lifts the skin, and can be then plainly seen. As the contraction relaxes it disappears, often with a sizzling sound, which can be heard, and then becomes much softer to touch. But even in this state the tubular induration can be felt." The autopsy showed a cancer of the pylorus, with enormously hypertrophied muscularis in the neighbourhood.

An extraordinary phantom muscular tumour in the epigastric region was seen in a woman, aged fifty-two, admitted June 8th, 1893, with a sarcoma of the right jaw and numerous multiple nodules in the abdomen. One of these, situated between the navel and ensiform cartilage, formed a superficial, button-like mass, which projected at intervals beneath the skin, forming a hard, ovoid, painless tumour about the size of a walnut. It then relaxed and disappeared completely, with a sizzling sound which could be heard at some distance from the bed. It seemed to be in the neighbourhood of the pylorus, but we never could get positive evidence of disease of the stomach, and the case did not come to autopsy.

Active, visible movement, is not only seen in the enlarged stomach, but may be present in an organ of normal size, or even when contracted.

In **No. 51** the peristalsis was well marked, and a tumour readily felt. The stomach was not enlarged. This case was operated on, and the pylorus excised.

In **No. 88** peristalsis was very visible, although the lower border of gastric resonance was 9 cm. from the navel.

No. 78 was a very remarkable case. The patient was admitted Sept. 19th, 1894. There was prominence in the epigastrium, and on palpation an indistinct mass was felt, which after inflation emerged below the left costal margin. No definite edge could be felt. Very active peristalsis was visible. On Nov. 26th Dr. Osler noted that no tumour could be felt until after inflation, when, on drawing a deep breath, a mass descended in the left parasternal and nipple lines, coming from beneath the

costal border. In this case the stomach findings and the patient's general condition strongly supported the diagnosis of cancer.

Another instance of very active peristalsis in a small stomach was in **No. 144**, in which a tumour mass was plainly to be felt in the left epigastrium. The peristalsis was very marked, and was entirely above the line joining the tips of the tenth ribs.

Visible peristalsis causing a localised bulging tumour in the epigastrium is also common with ulcer of the stomach. A very remarkable case of this kind has been reported by Dr. Osler, in which, in connection with a stenosis following ulcer, a tumour mass was visible in the epigastric region, which appeared and disappeared. On watching the abdomen an elevation of the skin took place and a definite tumour projected, which could be seen from a distance. After remaining for about half a minute it gradually subsided. On palpation when the tumour was visible there was a firm, hard, somewhat sausage-shaped mass, which, as the tumour disappeared, relaxed and became soft.

IV. **Mechanical Mobility.**—Tumours of the stomach may occupy almost any region of the abdomen; indeed, a tumour of the stomach has been found in the pelvis (Hilton Fagge). The large solid tumour of the pyloric region may shift its position with the attitude of the patient, or may be grasped and moved freely from one side of the abdomen to the other. In eight cases of this series the tumour mass presented an unusual degree of mobility. Two of these, **No. 43** and **No. 51**, have already been referred to in Dr. Osler's Lectures on the "Diagnosis of Abdominal Tumours." Fig. 4 illustrates the position into which the solid tumour of the pylorus could be placed in **No. 43**. In **No. 72** there was a large mass, evidently at the pylorus, situated to the right of and below the navel. It was extremely movable, and could be pushed to a position above and to the left of the navel. In **No. 81** (fig. 5) there was a large tumour, probably of the anterior wall, which was very movable between the costal margins.

One of the most remarkable tumours of this kind was the following :—

No. 107.—R. B. (hosp. no. 15,236), male; was admitted Feb. 15th, 1896. Occupying left hypochondrium, and extending into left lumbar, and above into the epigastric regions and below into the left upper

quadrant of the umbilical region, was a firm, solid mass, irregular on the surface. Below and to the left the outline was rounded and easily defined; to the right the border was indistinct. Above, in the parasternal line, it passed below the costal margin. On deep inspiration the mass descended so that the fingers could be placed above it. The lower border was then palpable two fingers' breadths below the transverse navel line. On bimanual palpation, the tumour did not fill the flank. It could be pushed forward and easily taken between the two hands. On deep inspiration it could be grasped readily, and moved to and fro between the hands. The mass felt about the size of a cocoanut. It could be drawn over entirely beyond the middle line and kept there,

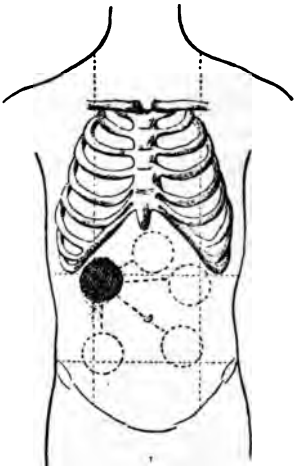

FIG. 4 (Case No. 43).—Showing the positions into which the tumour could be placed.

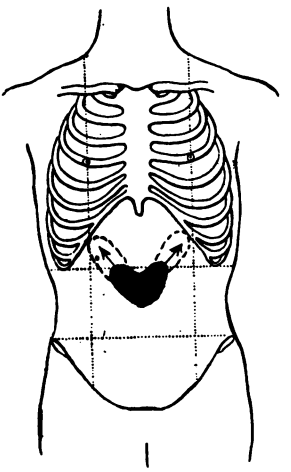

FIG. 5 (Case No. 81).—To illustrate mechanical movement of the tumour.

leaving the left hypochondriac and left umbilical regions free. There was no special change on inflation. The left kidney was distinctly felt.

Feb. 25th.—The tumour to-day was in the left hypochondrium and epigastric regions, and altogether above the transverse costal line. It could be tilted forward with the hand in the left flank, and moved down below the navel as before. When the patient turned on left side it fell downwards, so that the right border passed beyond the left sternal line. When he turned on the right side the tumour fell over, so that the left border was beyond the median line, and the tumour could be felt beyond the right nipple line. Fig. 6 illustrates the positions into which the growth could be placed.

Feb. 28th.—Operation (Dr. Halsted). Large massive tumour of anterior wall of stomach was found, which did not involve the pylorus, but left it and a zone of almost 3 or 4 cm. quite free.

March 29th.—The wound is well healed, and the mass occupies the left hypochondriac region—extending to the tip of tenth rib, and below just to the level of the navel. To the right it extends a little beyond the median line, and above to within two fingers' breadth of the level of the ensiform. Its mobility is quite as marked as before. It can be pushed over to the right so that the right border is in the mid-axillary line, and all but a small portion of the tumour is to the right of the middle line. The mass has apparently not increased much in size.

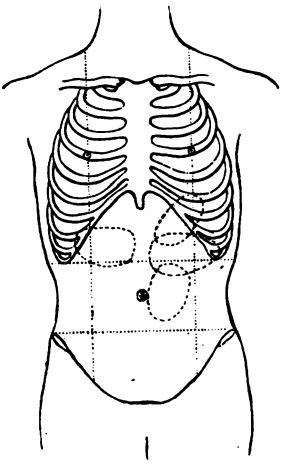

FIG. 6 (Case No. 107).—To illustrate the mobility of a tumour of the anterior stomach wall.

No. 114 showed a large visible mass in the right epigastrium. It moved markedly with inspiration. It could be pushed completely to the left of the median line. When the patient lay on the right side the mass was quite to the right of the median line, and when he turned on his left side the tumour fell back under the left ribs and could not be felt. It was also very movable with inflation.

No. 115 showed the effects of respiration, mechanical movement, inflation and position on the mobility of the tumour. The mass was visible in the right epigastrium on inspection. It descended several inches with inspiration, and on inflation of the stomach the tumour moved across the middle line from the left

to the right epigastric region. Grasped in the hand, it could be pushed upwards to the left, so that its right border crossed the median line. It could be pushed back about the same distance to the right. When the patient was on his left side the tumour fell completely under the ribs and could not be felt; when he turned on his right side the tumour fell over beyond the median line.

Of the circumstances influencing the mobility of tumours, the following are the most important.

Position of the Growth.—Tumours of the pylorus, or in the pyloric region, are the most freely movable.

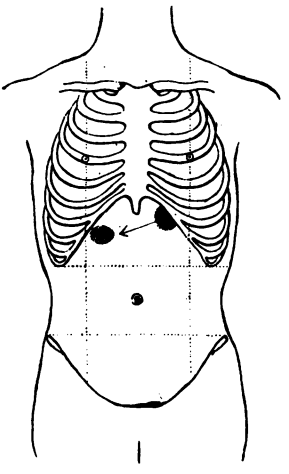

FIG. 7 (Case No. 134).—Showing the change in position of the tumour on inflation.

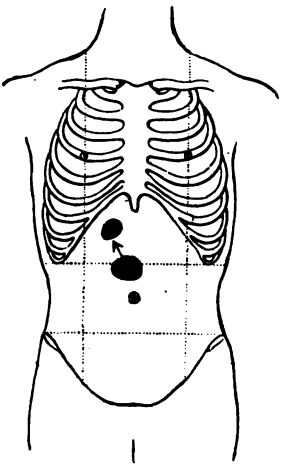

Fig. 8 (Case No. 112).—Showing upward movement of the tumour after inflation.

Size and Character of the Growths.—The round solid masses drag down the stomach, relax its attachments, and are capable of the greatest extent of movement.

The mechanical effect of large *quantities of fluid* in the stomach when the stomach is dilated is important in dragging down the tumour. One frequently sees a remarkable change in the locality after the stomach is reduced in size by *repeated washings*. A mass occupying a position between the tip of the tenth rib and the navel may so change its locality as to be just beneath the left costal margin.

Influence of Inflation.—Distension of the stomach with gas may alter very much the position of the tumour. Sometimes it may become more evident, as for example in **No. 114**, in which before inflation the tumour was about midway between the 8th left costal cartilage and the navel. After inflation it occupied a corresponding position on the right side. The tumour is most frequently moved downwards and somewhat to the right, as shown in fig. 7. It may, however, move in other directions, as upwards, as shown in fig. 8.

CHAPTER VII.

STUDY OF THE TUMOUR (continued).

TUMOUR FORMED BY THE DILATED STOMACH — GENERAL FEATURES — ANALYSIS OF CASES—VARIETIES OF PERISTALSIS—LOCAL TUMOURS WITH THE DILATED STOMACH — HOUR-GLASS STOMACH — FEATURES ASSOCIATED WITH DILATATION—ILLUSTRATIVE CASES.

THE stomach itself, when dilated, may form a readily visible tumour, and one that under some circumstances is easily palpable. This condition is very often overlooked by practitioners,

FIG. 9.—Profile view of the abdomen of No. 3, aged 65, showing the tumour formed by the dilated stomach. From a photograph taken during life.

and even in special works sufficient stress is not laid upon its importance. As an introduction to the question, the accompanying illustrations from **No. 3** of this series may be studied. The two photographs taken during life show a remarkable degree of abdominal distension, and the one taken after death

shows an enormously dilated stomach *in situ* (figs. 9, 10, and 11). They were taken from a woman, aged sixty-five years, who was admitted to the hospital complaining of attacks of vomiting, which had persisted for nearly two years, during which time she had become gradually emaciated and very weak. She had at intervals brought up enormous quantities of fluid. On inspection the abdomen was greatly distended, particularly on the left side and in the umbilical and hypochondriac regions. It was uniform, but at intervals there were slight irregularities

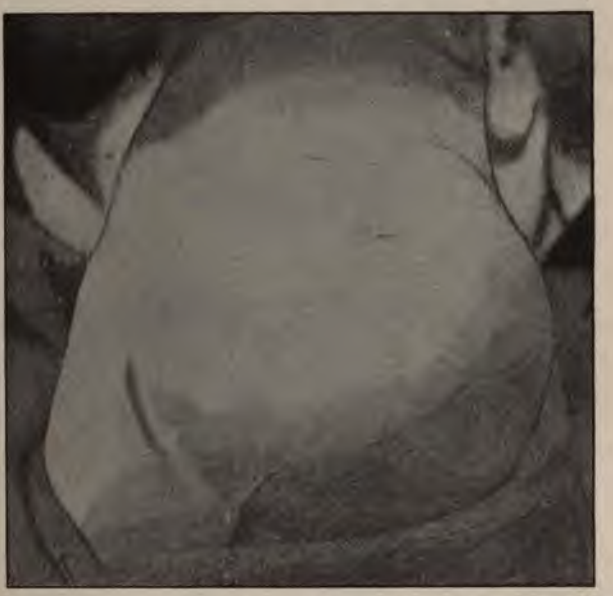

FIG. 10 (Case No. 3).—Tumour of the abdomen caused by a dilated stomach. From a photograph taken during life.

and elevations ; no marked waves of contraction. On palpation the abdomen was everywhere soft, except at a point to the right of and just below the navel, where there was a hard, resistant mass. At first it seemed scarcely possible that the entire abdominal distension could be due to a dilated stomach ; but the reduction in size after vomiting and after lavage, the depth to which the stomach tube could pass, and the irregular waves of protrusion, left no doubt that the distension was due to an enormously dilated stomach. Dr. Osler has reported

this case briefly in his *Lectures*, but it is worthy of a fuller consideration.

No. 3. *Enormously Dilated Stomach, Multiple Primary Carcinoma.*—S. A. (hosp. no. 489), aged 65 years, female, admitted Nov. 6th, 1889, complaining of vomiting, with loss of weight and strength

FIG. 11 (Case No. 3).—Showing the position and size of the stomach. From a photograph taken at the autopsy.

The present illness began two years before with dyspepsia and vomiting. The vomiting had continued, becoming more frequent and more severe. She had often vomited large amounts; at these times she usually brought up large quantities of gas that nearly smothered her. She had lost much weight and strength. One month ago she noticed at times a lump rise in the abdomen, and this she could see and feel move from side to side.

Examination showed a greatly distended abdomen, particularly on the left side and in the epigastric and hypochondriac regions. The surface was uniform, but at intervals there were slight irregularities and elevations. Peristalsis at times was well marked, outlining the stomach. A nodular mass was felt at the pyloric region. Under lavage and careful diet the stomach became somewhat reduced in size. The patient gradually sank, and died on Nov. 17th.

Autopsy showed an enormously dilated stomach, the fundus reaching to the middle of Poupart's ligament. A large nodular mass occupied the lesser curvature. On opening the stomach two litres of dark grumous material were found. There was a large ulcerated mass at the pylorus, which was so narrowed that only the tip of the little finger could be got into it. This mass extended 6 cm. into the stomach; its surface was ulcerated. A nodular mass was also found in the right breast, which was regarded as being also a primary growth.

In the present series there were 42 cases in which the dilated stomach itself formed a recognisable tumour either before or after inflation. The tumour, as shown so well in fig. 10, is usually asymmetrical, and the greatest prominence is in the left side of the abdomen and in the lower umbilical region. Every part of the abdomen, except the epigastric region, may be occupied by the enormously dilated organ. Usually the greatest prominence is below the navel, as is indeed well shown in the figure. When enormously distended, inspection may not show the very characteristic shape of the organ. In other cases the shape is so characteristic that the diagnosis is made at a glance. The outline of the greater curvature descends on the left side, turning at the level of the anterior superior spine of the ilium, and passing to the right at a variable distance above the pubes, sometimes not more than an inch, sometimes midway between this part and the navel. Curving upwards, it ends either in the right flank, or more frequently in the right upper quadrant of the umbilical region. In other instances it passes directly beneath the right costal margin. The lesser curvature, even more distinctly to be seen, passes vertically, parallel with the left border of the sternum, or in the parasternal line, curves to the left of the navel, and crosses the middle line in extreme dilatation, usually at or below the level of the navel.

Peristalsis is usually to be seen, but it may require very careful and prolonged inspection. Among the 42 cases in which the stomach formed a visible tumour in the abdomen, there

were only eight in which peristalsis was not seen. It is not improbable, however, that on very careful and protracted observation peristalsis can always be found in a dilated stomach. It is indeed singularly variable, and we have observed cases in which vigorous waves were present one day, while on the next no amount of stimulation called forth any movement. Frequently, after thorough washing out of the organ the movements may cease, and as a rule their activity decreases after lavage, but not invariably. In **No. 120,** with a diminution in the size of the organ after washing, the peristalsis became much more active.

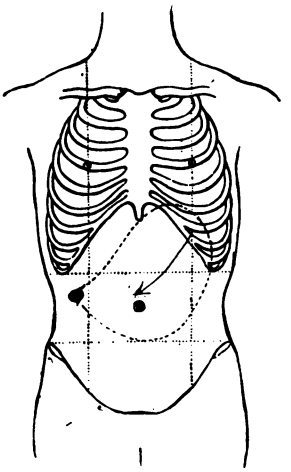

FIG. 12 (Case No. 120).—Showing an enlarged stomach with a small nodular growth at the pylorus.

The size of the stomach and the position of the growth are shown in fig. 12. It is to be borne in mind that visible peristalsis may be seen in a perfectly normal, or even in a contracted stomach, or in the common atonic dilatation associated with enteroptosis.

There may be remarkable abdominal protrusion in the dilated stomach. One sees this in inflating with the bicarbonate of soda and tartaric acid, particularly if the latter be given through a tube, so that the patient's abdominal wall is entirely relaxed. The gas may then suddenly inflate the stomach, causing a remarkable protrusion in the abdominal wall. In other cases

spontaneously extraordinary local protrusion may suddenly occur, as in the following case:—

No. 127. *Unusual Abdominal Protrusion; Tumour.*—J. B. (hosp. no. 18,374), aged 52, farmer, complains of pain and vomiting. With the exception of some bladder trouble he had always been healthy. He had used alcohol moderately. He was in the habit of eating his food very rapidly, and drank his tea and coffee very hot.

Present illness began three months before with some epigastric pains. With this he rapidly lost strength, and soon had to give up work. Vomiting only came on about two months before; it had been about once every three or four days, and usually about half an hour after a meal. The vomitus was large in amount, and often contained the food eaten the previous day. He had lost in weight, and was so weak that he could hardly walk.

Examination showed a much emaciated man. The abdomen presented a very striking picture. Every few minutes a marked protrusion would appear, with irregular bulgings and peristaltic waves. This was associated with hardening on palpation. In a few moments the protrusion would sink back and disappear. When the mass became prominent no sequence of peristalsis was observed. It shot up suddenly as if there were force applied from below, and no definite wave of peristalsis was seen. During this hardening no tumour was to be made out. During the interval when the stomach was soft an ill-defined tumour was felt between the umbilicus and right costal margin. The patient himself had never noticed this peculiar abdominal condition. There was vomiting of large amounts of dirty thick fluid while he was in the hospital. His condition did not improve, and he left rather weaker than on admission.

The question of the relative proportion of cases of dilated stomach due to malignant growth is interesting. Broadbent[1] states that extreme dilatation from malignant obstruction is rare, as in cancerous disease the patient does not live long enough for the establishment of the condition. Our experience has been that a much larger number of cases of dilatation of the stomach are due to malignant disease than to any other single cause. Thus, excluding the ordinary cases of moderately dilated stomach in splanchnoptosis and cases of descensus ventriculi in thin, nervous women, there were during the same period of time as that in which the present series of cases (42) occurred, only

[1] *Practitioner*, January 1898.

25 cases of dilatation of the stomach apart from malignant disease.

Local Tumours with Dilated Stomach.—In a majority of the cases when the stomach itself forms a tumour, a local nodular mass may also be felt. When the organ is greatly dilated the pyloric pouch may completely obscure a nodular mass at the pylorus itself. Only after repeated lavage with reduction in the size of the organ the tumour may become evident. In other instances the diagnosis must be made from the general symptoms. In **No. 146**, in which, with dilated stomach and the usual symptoms of that condition, no tumour was made out while the patient was in hospital, the rapid loss of weight and strength, the anæmia and the chemical analysis, all pointed to carcinoma. Only a few days before death the physician found a distinct tumour.

Care must be taken not to mistake hypertrophied muscularis for malignant growth. We shall have more to say on this in connection with the diagnosis from ulcer, but in many instances with a tumour at the pylorus it may be impossible to say how much of the palpable thickening is due to infiltration of the growth, and how much to hypertrophy of the muscular coats. Of the 42 cases there were only 4 in which a local tumour could not be made out. Two of these came to autopsy, and are interesting enough to be given in full. The first also shows the rare condition in which there is extreme dilatation of the stomach in connection with the new growth in the pyloric region which did not involve the pyloric ring.

No. 108. *Dilated Stomach: no tumour diagnosed; Autopsy; Tumour; Gallstones.*—E. B. (hosp. no. 15,343), male, aged 75 years, admitted Feb. 26th, 1896, complaining of vomiting and diarrhœa. His family and personal history was negative. His present illness began six weeks before with cough, which was soon followed by vomiting and diarrhœa. He had not vomited any blood, nor had there been any pain. He had lost weight rapidly.

Examination showed a sallow, emaciated man, who vomited frequently during the examination. The abdomen was scaphoid. At intervals a prominent mass stood out in the epigastrium, and showed waves of peristalsis passing from left to right. At these times he vomited and complained of "cramps." No tumour could be made out apart from the hardening of the stomach. He rapidly sank and died.

Autopsy.—There was an infiltrating new growth in the pyloric region, involving about one-quarter of the stomach. It was firm and dense, and the edges were sharply limited. The pylorus itself was free. The omentum was slightly adherent to the stomach. The liver showed metastases. The gall-bladder contained two stones, and the common duct was dilated and contained a line of stones about the size of peas.

The second case showed many similar features, but the growth was much smaller.

No. 10. *Dilatation, Peristalsis; no tumour felt; Autopsy.*—G. P. (hosp. no. 1,331), aged 60, male, admitted June 3rd, 1890, complaining of vomiting and loss of weight. The family and previous history were unimportant. The present illness had begun ten months previously with distress and belching after eating. After these symptoms had lasted for four months pain and vomiting came on, which continued until the present. There had not been any vomiting of blood, or of very large amounts. He had lost much weight and strength.

Examination showed pallor and emaciation. The abdomen was markedly distended in the upper part, the fulness extended to below the navel, and descended with respiration; slow peristaltsis was visible passing over it. The liver was normal in size. Over the prominent area there was an elastic feel on palpation, and the note was tympanitic. There was no tumour to be felt at any time during the two months he was in the hospital. The patient gradually sank, and died August 9th, 1890.

Autopsy.—There was no tumour to be felt through the abdominal walls. The stomach was found to be dilated. There was thickening and induration at the pylorus, which did not admit the tip of the little finger. The thickening extended for 3 cm. from the pylorus. There was a small area of ulceration at the pylorus. There were numerous secondary nodules over the mesentery and peritoneum.

The small size of the tumour at the pylorus accounts for the negative condition on examination. With the occurrence of secondary nodules on the peritoneum there was no ascites. The presence of this symptom does not always conceal peristalsis, as in **No. 12**, in which with a considerable amount of fluid in the abdominal cavity the waves of peristalsis were readily visible.

Position of the Tumour in Dilatation.—Of the 38 cases in which a tumour was felt, in 27 it was recognised to be at the pylorus, in 2 in the body of the stomach (both of these, however, are open to doubt, as the tumour may have extended from the

pylorus), and in 9 we were uncertain as to its exact position. An interesting case illustrating the variability of a tumour probably pyloric is the following :—

No. 2. *Dilated Stomach, Movable variable Tumour.*—J. B. (hosp. no. 470), male, coloured, aged 37 years, admitted Nov. 4th, 1889, complaining of vomiting with pain in the epigastrium and swelling of the abdomen. The present illness had lasted two years, and he first had belching and heavy feelings in the epigastrium. Vomiting began eight months before. This came on soon after meals. He noticed that it required a very large amount to fill his stomach, and also that after a meal his

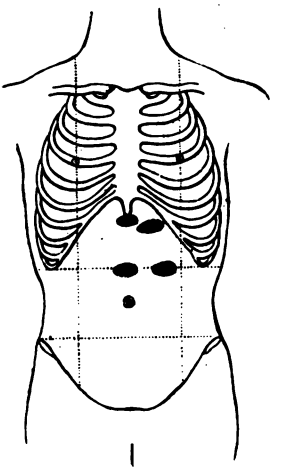

FIG. 13 (Case No. 2).—Showing the position of a movable pyloric tumour.

stomach "swelled and moved as if he had something alive in him." He had vomited blood, and had lost nearly 40 lbs. in weight.

Examination showed a prominent mass in the lower epigastrium, over which waves of peristalsis passed at times. A rounded, somewhat elongated tumour was felt lying at first in the middle line, about two inches above the navel. It was firm, smooth, and could be moved up and down (fig. 13). Two days later, after a severe attack of vomiting, the tumour lay more to the left. Four days later the tumour was not to be palpated. The day following, after thorough washing of the stomach, the tumour was felt half an inch below the ensiform; the fingers could be passed above it, and it could be pushed over to the left costal margin. The tumour seemed larger after the stomach had been reduced by washing, and one or two other nodular masses were felt.

The patient rapidly lost weight in the hospital and was discharged. The further course is not known.

Hour-glass Shape of the Dilated Stomach.—Sometimes extreme constriction about the middle of the lesser curve gives an hour-glass shape to the organ. This does not necessarily indicate a true sand-glass stomach. In **No. 4** the note reads: "In the left half of the epigastrium is a marked depression,

FIG. 14.—To illustrate Case No. 76.

corresponding to the lesser curvature. Every few minutes waves of peristalsis cross the abdomen, during which the outline of the organ is unusually distinct, and at the lesser curvature there is an indentation which gives an hour-glass shape to the organ." At the autopsy there was a cancerous growth at the pylorus, but the organ itself did not show any special peculiarity in form.

One of the most remarkable cases is illustrated by the accompanying figures (14, 15, and 16), which show a greatly

distended stomach in a woman who had a very relaxed abdomen with widely separated recti. Fig. 14 shows the dilated stomach covered by the skin only, and really forming a ventral hernia. The transverse colon and its sacculations are plainly to be seen. When the waves of peristalsis passed the tumour bulged and got hard ; an hour-glass contraction was visible. Then, as shown in fig. 15, the outlines became more definite and the right section of the stomach smaller. In fig. 16 the stomach is shown as a

FIG. 15.—To illustrate Case No. 76.

prominent rounded mass. A brief abstract of the case is as follows :—

No. 76. *Dilatation ; Hour-glass contraction. Tumour ; Ventral Hernia.*—S. M. (hosp. nos. 10,653 and 14,022), female, aged 39, was first admitted on Aug. 14th, 1894, complaining of abdominal pain. She had had numerous pregnancies. Her present illness had lasted for three months during which time she complained of pain in the umbilical region,

with belching of gas and nausea. She had never vomited. There had been rapid loss of weight and strength.

Examination showed a sallow, poorly nourished woman. The abdomen was prominent, with remarkably relaxed walls, and a large easily reduced ventral hernia the size of a child's head between the recti, which were wide apart. In the left epigastrium a nodular mass was felt, which descended with inspiration. On inflation the outlines of the stomach were readily made out; the lower border extended about 4 cm. below the navel, and the lesser curvature was about midway

FIG. 16.—To illustrate Case No. 76.

between the navel and ensiform cartilage. At times the stomach assumed a definite *hour-glass* shape. The wearing of a bandage gave her much comfort.

The previous history of this patient was unusual. The only severe symptom, pain, had been present for three months, but vomiting had never occurred. On a subsequent admission two months later the vomiting of large amounts was a prominent symptom.

On certain General Features of these Cases.—Though wasted, the patient may not present a cachectic appearance. Some of the cases have a remarkable emaciation, with redness and dryness of the skin. The lips and the mucous membranes may be of a very bright red colour, and there may be polycythæmia, with a blood count of 6,000,000 red corpuscles. In a patient (seen with Dr. Hundley) who had been an active, vigorous man, aged about 56 years, and who only six weeks previously had been on a business trip, the emaciation was as extreme as seen in any case of cancer of the œsophagus. The

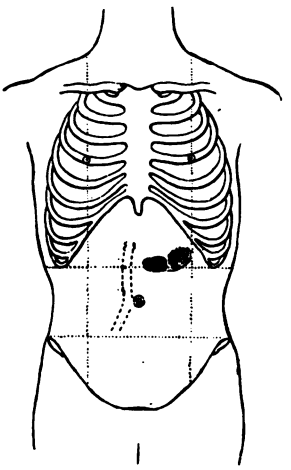

Fig. 17.—Showing the abdominal aorta visible to the right of the navel with a visible gastric tumour to the left of the median line.

patient was literally "skin and bones," yet his colour was excellent. The emaciation of the abdomen was remarkable—so much so that the abdominal aorta could be seen throbbing to the *right* of the middle line, and the bifurcation could be seen 2·5 cm. below and to the right of the navel, and the right common iliac could be seen plainly (fig. 17).

One reason for the rapidity of the wasting is the secretion of liquid into the dilated stomach, draining the tissues, and helping to produce the remarkable exsuccous condition. The following case illustrates this general condition very well.

No. 120. *Dilatation; Pyloric Tumour; Constant Secretion into Stomach; Operation; Death; Autopsy.*—G. H. (hosp. no. 17,442), aged 42 years, bricklayer; admitted Sept. 30th, 1896, complaining of pain, vomiting, loss of weight and strength. For the past five years he had had stomach trouble. His habits of eating were careless, and he got his meals at irregular times. Every few weeks he had attacks of gastric pain and vomiting, which lasted for two or three days.

Present Illness had lasted for five months, since which time he had been unable to work. But the history gradually merged into his previous stomach trouble. During these five months he had vomited every day, usually large amounts of some liquid and undigested food. He had lost 25 lbs. in weight, and had become very weak.

Examination showed a much emaciated man, who looked twenty years older than his age. The abdomen was scaphoid. At times waves of peristalsis were visible passing from left to right. When they reached the right hypochondrium a distinct mass was felt. There was a large area of stomach tympany. The mass was evidently at the pylorus; it was readily felt, and was always more palpable at the end of peristalsis. Marked clapotage was obtained. On passing the tube large amounts—400 to 1100 c.c.—were always obtained from the stomach. Particles of corn were washed out which the patient had eaten nearly a month before.

Secretion into Stomach.—On two occasions the stomach was washed and emptied as thoroughly as possible. For 48 hours afterwards the patient was fed by rectum, and nourishment by the mouth was stopped. At the expiration of this time the stomach contained on the first occasion 545 c.c. of fluid, and on the second 500 c.c. Under continued washing and careful diet the stomach was much reduced in size, and the lower border, which had been midway to the pubes below the navel, was just at the navel. Peristalsis was more active now than before.

Operation was advised and consented to. It was done by Dr. Bloodgood. Gastro-enterostomy was done, and the jejunum joined to the posterior wall of the stomach. The patient did not rally well from the operation, and died in about 48 hours.

Autopsy.—The stomach was dilated, and contained a small amount of grumous material; the walls were thick. At the pylorus was a mass the size of a pigeon's egg. The orifice was much contracted.

This case is of much interest. The constant secretion of fluid into the stomach had drained his tissues of water so that he was very thin, with dry harsh skin. His blood examination showed hæmoglobin, 70 per cent.; red corpuscles, 4,000,000;

white corpuscles, 5000. The blood was concentrated from the loss of fluid. The large amounts obtained from the fasting stomach are striking. Test breakfasts showed absence of free HCl and the presence of lactic acid. The patient's condition was probably worse than was supposed when operation was advised. The question may be raised as to whether patients in this state of "desiccation," if it may be so termed, are not very unfavourable subjects for operation.

CHAPTER VIII.

STUDY OF THE TUMOUR (continued).

TUMOUR FORMED BY THE CONTRACTED STOMACH—VARIETIES — WITH GROWTH AT THE CARDIA—WITH GENERAL INVOLVEMENT—ANALYSIS OF THE SYMPTOMS—CASES—DIAGNOSIS FROM CIRRHOSIS VENTRICULI—RESUMÉ OF SYMPTOMS.

Tumour formed by the Atrophic Cancerous Stomach. — This interesting condition, which is not very fully referred to in the literature, was present in 12 cases, in 6 of which it was recognised during life.

The stomach itself, in a state of contraction, may form a palpable tumour—first, in narrowing of the œsophagus or of the cardiac orifice, when the organ may so contract and shrink as to be felt as a narrow, firm cord below the left costal border; secondly, when there is diffuse thickening of the stomach walls with contraction of the lumen, either in cirrhosis ventriculi or in diffuse cancerous infiltration.

As an illustration of the first we may mention the following case :—

Mr. A., aged 68, was seen Feb. 24th, 1894, complaining of increasing inability to swallow solids for nearly six months, and at present he is scarcely able to swallow milk. The stomach tube could not be passed by his physician. The obstruction was in the lower end of the gullet. The patient was very thin, and the face and chest were much emaciated. The interest relates to the condition of the abdomen.

The following note was dictated at the time of observation :—

"The abdomen is somewhat excavated, uniform; no peristalsis noticed; on palpation, no clapotage; stomach tympany much reduced.

On palpation, in the upper left quadrant of the epigastrium there is felt a tubular body in a condition of alternate contraction and relaxation. It became extremely hard and firm, and extended from the costal border in the parasternal line to a little beyond the middle line, passing obliquely downwards. When the contraction had passed it could scarcely be felt. The sizzling of gas could be heard in it, and also very plainly felt as the muscular walls relaxed. There was resonance over it. Once or twice, when in a condition of contraction, it was seen that it plainly lifted the skin covering the thin abdominal parietes."

The marked evidence of obstruction of the œsophagus was in favour of the view that it was a contracted stomach, though of course there may have been extension of the disease to the walls. A few months later the patient died suddenly. There was no autopsy.

The following is an analysis of the chief features of the 12 cases in which the stomach was contracted in association with tumour. As mentioned, in 6 cases the condition was diagnosed during life. In the other 6 cases, in 3 the tumour was felt, but it was not recognised that it was really the whole stomach ; in 1 the stomach tumour was obscured by a cancerous liver ; in 2 the tumour was not recognised at all, as there was ascites.

Pain was a special feature in 5 cases ; slight in 1 ; no pain in 6.

Vomiting was present in 8. An interesting question is the connection between the small stomach and the time of vomiting. In 6 of the cases the patients rejected the food a very short time after eating. **Nos. 122** and **144** gave a marked history of inability to retain any but the smallest amounts of food, a feature which had been progressive.

The Test Breakfast.—Of 9 cases in which it was given, in 5 nothing was obtained ; in 3, 15 cc., 10 cc., and a " few drops " were obtained. In 1 case 80 cc. were obtained. This patient had dyspepsia, and presented some contraction of the pylorus.

Inflation never gave any marked change. In the earlier cases the attempt was usually made to inflate through the tube. It was generally unsuccessful.

Duration.—Of 9 cases in which it was known, there were 6 in which the fatal termination occurred within six months of the onset of the symptoms.

Abstracts of the histories giving notes of the character of some of the tumours :—

In **No. 16,** a male, aged 49, admitted Jan. 23rd, 1891, there had been vomiting, rapid loss of weight, and the presence of a lump in the abdomen. Examination showed fulness in the epigastrium, a wide area of transmitted aortic pulsation, and an irregular hard mass which could be felt 2 cm. below the costal margin. The surface was irregular and studded with prominences. There was, in addition, a deeper mass in the median line. The autopsy showed a small contracted stomach corresponding to the mass which was felt below the costal border. The mass felt in the middle of the abdomen was the infiltrated omentum. There was an extensive tumour mass on the posterior wall of the stomach.

No. 36, female, aged 38, admitted May 26th, 1892, with a history of gastric disturbance for eighteen months with loss in weight. She was much emaciated. The abdomen showed a fulness in the epigastrium, and on palpation a mass was felt extending from the right parasternal line across into the left hypochondrium and passing under the eighth and ninth ribs. It descended with inspiration. Above it several nodular bodies could be felt. An interesting peculiarity was that at times this transversely-placed mass felt soft, while at others under the hand it could be felt to contract into a firm, cord-like body. After a test-breakfast only a few drops could be expressed, which did not show any trace of free acid. On attempting to inflate the stomach through the tube the air could be felt bubbling beneath the hand, but the organ could not be inflated. The patient was subsequently lost sight of.

No. 50 has already been reported fully in the *Lectures on Abdominal Tumours*, by Dr. Osler (page 31). In this case a ridgelike mass was felt in the left hypochondrium extending across the middle line to the right as far as the parasternal line. The lower edge was very distinct, and the question was raised whether it was not a rolled omentum (fig. 18). The stomach could not be inflated, and any attempt caused vomiting and a good deal of distress. The autopsy showed a greatly reduced stomach, measuring 13 cm. in its extreme length. The transverse diameter was from 4 to 5 cm. It was exceedingly firm and dense. The hard, resisting edge which we had felt so plainly during life corresponded to the greater curvature. The orifices were not narrowed. The walls were from 8 to 10 mm. in thickness at the cardia, and 13 to 14 mm. at the pylorus. The lining membrane of the stomach was smooth and showed no erosions. On microscopical

examination, the mucous membrane was almost entirely deficient. The submucosa was occupied by large groups of cancer cells between strands of connective tissue. The layers of the muscular coat were much hypertrophied, and, invading the interstitial tissue and sometimes in the muscular bundles themselves, were numerous cancerous cells.

No. 69, admitted April 2nd, 1894, with stomach symptoms of nearly two years' duration and progressive loss of weight. Below the ensiform cartilage extending to the left an elongated sausage-like mass could be felt, which alternately contracted and relaxed under the hand. A test breakfast yielded only 15 cc. of a clear, non-acid fluid. The

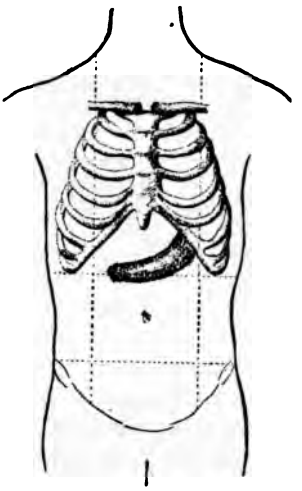

FIG. 18 (Case No. 50).—Showing the position of the tumour mass consisting of diffusely infiltrated stomach walls.

autopsy showed a small, hard stomach, forming a sausage-like mass. The extreme length of the organ from cardia to pylorus was 17 cm., width 8 cm. The mucous membrane was uneven, and showed small knob-like elevations. This case was one of very great interest in many respects. The history was unusual, as he had had neither pain nor vomiting. The mass, which in reality, as shown by the post-mortem, corresponded to the stomach itself, we had regarded as the pylorus and adjacent parts.

No. 73, male, aged 61, admitted June 26th, 1894. The condition was not recognised. The abdomen was distended and tympanitic, and the walls very tense and difficult to palpate. The patient was very

œdematous, ascites came on, and he had marked urinary changes, so that the case was regarded as one of chronic Bright's disease. The patient died on July 4th. The autopsy showed a small, contracted stomach, the walls of which were diffusely invaded, the infiltration extending from the lower end of the œsophagus to the pylorus.

In **No. 74**, a male, aged 78, admitted June 29th, 1894, a large flat mass (Fig. 19) emerged beneath the left costal margin and extended into the epigastrium. Nothing was obtained from the test breakfast. The vomiting came on immediately after eating, and he complained of a sensation as of the food lodging in his epigastric region. He was discharged and subsequently lost sight of.

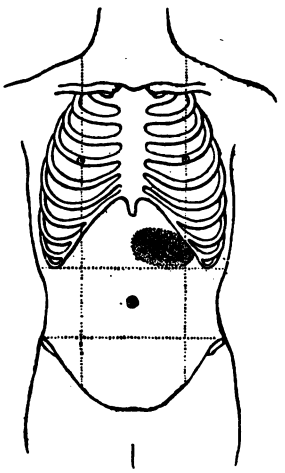

FIG. 19 (Case No. 74).—Tumour of contracted stomach.

In **No. 85**, female, aged 49, admitted March 1st, 1895, a mass was felt in the epigastrium, but the abdominal walls were too rigid to permit of a thorough examination. This was the only case in which a large amount of fluid was removed after the test breakfast, 80 cc. The autopsy showed a small stomach, only 12·5 cm. in extreme length, dense, hard and almost uniformly infiltrated with carcinoma. The circumference of the middle of the stomach was only 8 cm. The walls were 5 mm. thick at the cardiac end, 9 mm. in the centre and 11 mm. at the pylorus.

No. 121 has already been given under the subject of cancer in the young. This patient showed many of the same features as

No. 144, especially the inability to retain any but very small amounts of food. Fig. 20 shows the small area of gastric tympany.

In **No. 139**, coloured, male, aged 40, admitted Nov. 8th, 1897, the non-distensibility of the stomach, the agreement between the outlines of resonance and the palpable mass, and the extent of the tumour suggested general infiltration of the walls.

As **No. 144** is a case of a good deal of importance, it may be given in full.

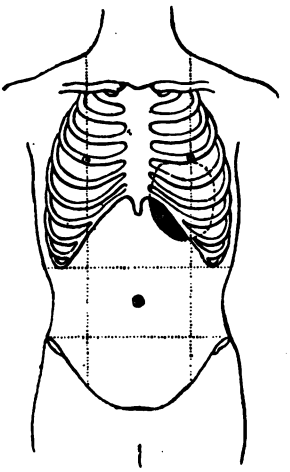

FIG. 20 (Case No. 121).—Showing the small area of stomach tympany after inflation, and the palpable tumour below the left costal margin.

Contracted Stomach—Masses of Tissue obtained.—J. G. (hosp. no. 21,481), aged 48 years, male, admitted Dec. 13th, 1897, complaining of nausea and some stomach disturbance. He was a physician, and had followed his own case closely. His family history was unimportant. He had always been very nervous. The present illness dated from the previous winter, when his digestion was slightly disturbed, especially in the mornings. At times he had some feelings of obstruction, especially in the swallowing of dry food. These symptoms, which really did not trouble him greatly, lasted until August 1897. He then had a stomach-tube passed. There was some obstruction at the cardiac orifice, but the stomach was washed out, and with the last part of the washing was a small amount of blood.

In Sept. 1897 he consulted Dr. Einhorn, of New York, who was unable to pass a stomach-tube, but passed bulbous sounds and also the œsophagoscope. Dr. Einhorn wrote: "I could not detect any thickening in the anterior wall of your stomach. I saw the stricture with the œsophagoscope." Dr. Einhorn treated him for six to eight weeks, and kept him on liquid diet.

On Oct. 1st, 1897, he was seen by Dr. Janeway, of New York, who passed a stomach-tube. He washed out the stomach, and obtained some bright blood with the last of the washing. He thought there was thickening of the anterior stomach wall, which was malignant.

His appetite had left him; in fact, food disgusted him. Nausea was frequently present. Vomiting had never been frequent. It had always been immediately after food. There never was any large amount of vomitus. Before Oct. 1897 he could easily drink two glasses of milk, but during October he noticed that his capacity was becoming less, and that he was only able to retain small amounts. If he took more it was regurgitated immediately. On admission, he was not able to take more than about 4 oz. at one time. Pain of late had been severe, but only when his stomach contained food. He had lost over 50 lbs. in weight, and much strength.

Examination showed pallor and emaciation, but no cachexia. The skin was very harsh and dry. The abdomen was retracted. There was slight fulness in the left epigastrium; on palpation high up in the epigastrium a distinct tubular body could be rolled under the fingers, just below the tip of the ensiform. It was not hard, and it was noted "that it suggests the lower part of a contracted stomach."

On passing a soft stomach-tube, it could be introduced a distance of 43 cm. from the incisors, but then met with obstruction. There was a distinct outflow of air through the tube; a soft bougie was passed the same distance, but some obstruction was felt. The distance was roughly measured externally from the incisors; the ordinary position of the cardiac orifice was 40 cm. The deglutition murmur was heard between 7 and 8 seconds after swallowing.

Test Breakfast. The tube was passed into the stomach after slight resistance, and 10 cc. obtained of semi-fluid material slightly blood-stained. There was no reaction for free HCl or lactic acid. Masses of tissue were found in the contents, which showed typical carcinomatous structure.

On inflation the area of stomach tympany was practically unchanged, and there was no change in the position of the mass.

Blood count: hæmoglobin, 75 per cent., red corpuscles, 5,600,000; white corpuscles, 4,800.

Digestion leucocytosis was well marked, the number of whites before the meal being 5,000, and three hours later, 9,500.

The following final note was made by Dr. Thayer: "The small size of the stomach, its slight apparent distension on inflation, the history of inability to retain more than small amounts of food taken at a single time, suggest that the stomach was reduced in size, and more or less generally infiltrated."

No. 150.—Female, aged 38 years, admitted March 15th, 1898, with a history of some fifteen months' indigestion with nausea and vomiting, The latter was usually soon after a meal. Nothing could be obtained after a test breakfast. No positive tumour could be detected through the very tense abdominal walls. An exploratory operation showed the peritoneum diffusely studded with secondary nodules of carcinoma. The stomach was very small, and appeared uniformly infiltrated with cancer.

Diagnosis from Cirrhosis Ventriculi.—We have looked over the recent literature of this condition with special reference to this point, and it does not seem likely that cancer of the stomach with marked contraction can be distinguished from it. The symptoms appear to be identical. The longer duration of the cirrhosis, signs of a chronic proliferative peritonitis or of cirrhosis of the liver, would be suggestive points. It is to be remembered that even post mortem it may be difficult to reach a positive diagnosis.

Resumé.—From the study of these cases it seems possible to select a fairly characteristic group of symptoms. In the history there are the facts of a gradually increasing loss of capacity for more than a certain amount of food taken at one time, and vomiting at once if larger amounts are taken. On examining the abdomen there may be an evident tumour under the left costal margin, or one which can only be felt on the deepest inspiration. The most important evidence is however obtained by the passage of the stomach-tube. This is arrested near the cardia, and at first an œsophageal obstruction may be suggested. The faint rush of air through the tube, which usually occurs when it enters the stomach—although careful attention and absolute quietness on the part of the patient are necessary to perceive it—and the immediate examination of the few drops of fluid on the end of the tube, are positive evidence of the tube having entered the stomach. No doubt remains if some amount be obtained. The utmost gentleness is required, as the tube

often gives great distress in these patients. Stomach contents, if obtained, are usually small in amount. Repeated amounts of less than 15 cc., along with the other symptoms are very suggestive. The length of tube passed should always be compared with the distance from the incisor teeth to the fourth dorsal spine. Bougies may be used gently, but one rarely obtains more information than from the use of the soft stomach tube. The area of stomach tympany is usually reduced in extent. On inflation the patient frequently vomits immediately, or, if not, there is no increase in the gastric tympany. This was very marked in several of our cases.

CHAPTER IX.

STUDY OF THE TUMOUR (*continued*).

TUMOURS OF THE PYLORIC REGION—SOME COMMON FEATURES—THREE GROUPS.—I. WITH THICKENING AND INDURATION—CASES—ESTIMATION OF THE DEGREE OF INVOLVEMENT—DIAGNOSIS FROM THICKENING ABOUT A CHRONIC SIMPLE ULCER AND FROM SIMPLE HYPERTROPHIC STENOSIS OF THE PYLORUS—CASES OF THE FORMER.—II. TUBULAR AND SMALL NODULAR TUMOURS—SYMPTOMS—NON-MALIGNANT TUMOURS OF THIS REGION—INVOLVEMENT OF THE PYLORUS IN GALL-BLADDER ADHESIONS.—III. LARGE NODULAR GROWTHS.

THE large number of cases, and the frequency of secondary conditions, make the tumours of this region of special interest. Among the 1300 cases tabulated by Welch, the pyloric region was involved in 61 per cent. Of the 45 cases of this series coming to autopsy, this part was involved in 24. There were also 6 cases of general involvement, which makes a total of two-thirds of the cases in which the pylorus was the seat of disease. The growth in 63 cases of the 115, in which a tumour was felt during life, was thought to be in the pyloric region. In the majority of cases the tumour is not restricted to the pylorus itself, but invades the adjacent stomach wall to a greater or less extent. Of the 24 autopsy cases, in only 3 was the growth strictly limited to the pylorus. Next to tumours of the anterior wall those of the pylorus are the least likely to escape recognition, yet of the cases coming to autopsy there were 4 in which a pyloric tumour was not felt during life, although in each a diagnosis of carcinoma was made. Two cases in which the pylorus and lesser curvature were involved were latent. Ascites or an enlarged liver may mask a growth. Even a tumour which, post mortem, looks as if it should have been readily palpable, may escape observation during life. Thus, in **No. 31,**

with moderate dilation, a diagnosis of malignant disease was made, but no tumour could be felt. At autopsy a hard mass was found which, with adjacent glands, was as large as a hen's egg.

The secondary effects have already been discussed in Chapter VII., and the important feature of mobility has been fully referred to. The tumour itself may be dealt with under three headings :—

Thickening and induration.
Tubular and small nodular tumours.
Large nodular growths.

I. **Thickening and Induration.**—The tendency of many pyloric tumours, as already noted, is to invade the adjacent stomach walls ; and this, with hypertrophy following as a result of stenosis, may produce a large mass. In such cases the recognition of the growth is usually easy. The tumour, as a rule, lies to the right of the median line ; it may, however, as already stated, show great mobility. It generally lies lower than the ordinary situation of the pylorus, and is frequently in the umbilical region. A typical case may be given :—

No. 28.—M. S. (hosp. no. 3,654), male, aged 36 years ; admitted Aug. 15th, 1891. The course was acute, as the symptoms had only lasted about three weeks. There were marked pallor and emaciation. The abdomen was retracted. In the epigastrium, about midway between the ensiform cartilage and navel, was a large irregular mass, which extended to the right almost to the costal margin, and to the left beyond the median line. It descended freely with inspiration. The lower edge was distinct, and could be raised by the finger. The patient rapidly lost ground, and died on Sept. 16th, after a course of about three months. No special change in the tumour was noted. *Autopsy* showed slight dilatation of the stomach, and a large mass in the pyloric region, involving the ring, which was contracted. The growth extended from the lesser curvature on each wall nearly to the greater curvature. The muscular coats were much thickened.

It must be borne in mind that enlarged adherent glands may partially account for an indurated tumour, or there may be other organs attached. In the following case the colon, duodenum and omentum were adherent to the pyloric end of the stomach, and with enlarged lymph glands made a large mass which was felt above and to the left of the navel.

No. 113.—H. C. (hosp. nos. 15,222 and 16,191), male, aged 44 years; admitted first on Feb. 13th, 1896, complaining of abdominal pain. The principal symptoms were pain and vomiting. *Examination* of the abdomen showed a tumour mass above and to the left of the navel. It descended markedly with respiration. On inflation the mass was carried downwards and to the right. The lower border of stomach tympany was 4 cm. below the navel.

He was discharged on March 13th somewhat improved, and readmitted on May 25th in worse condition than before. The tumour was much as previously noted. The patient died on June 27th, 1896.

Autopsy showed a dilated stomach, and the pyloric end occupied by a firm hard mass, which extended along the stomach wall. The colon and duodenum (and omentum) were adherent to the pyloric region, and ulceration had occurred into their cavities. The margins of these openings were firm and indurated. The adjacent lymph glands were enlarged.

This case will be referred to again when the question of perforation is discussed. It may be noted that there were no symptoms pointing to this condition. In **No. 52** a large mass was present in the epigastrium, extending on each side to about the parasternal lines. At autopsy this was found to represent a mass composed partly of a growth involving the pylorus and the stomach wall for 10 cm., with the adherent omentum, duodenum, and pancreas.

Caution is required in coming to an opinion as to the extent of the growth. In cases with much hypertrophy it is impossible to say how widely the infiltration has extended; this may not be possible even when the abdomen is opened. In judging of the extent and size of a gastric tumour, it is to be remembered that in a majority of cases the tumour is larger than appears by external examination. For this cause, after abdominal section, a contemplated excision may have to be abandoned. Examination under an anæsthetic may show a larger growth than was supposed. In case **No. 23** a mass was felt in the parasternal line below the right costal margin, which descended with inspiration, could be moved about, was very tender, feeling about the size of a walnut. After an anæsthetic was given the tumour was felt to be much larger. It was 7 cm. long and 5 cm. wide, readily movable, and felt firm and hard.

In connection with the subject of pyloric tumour, two conditions require special consideration—(1) the thickening about

a gastric ulcer, and (2) simple hypertrophic cirrhosis of the pylorus.

Induration about a Gastric Ulcer is particularly apt to lead to error in diagnosis. The history, symptoms, and physical diagnosis may all point to malignant disease. The tumour may resemble a malignant growth, and even after the abdomen is opened it may be impossible to speak with certainty. A histological examination may be required. The stenosis and induration may follow the healing of a gastric ulcer, or there is marked thickening and induration about the ulcer itself. The history may suggest gastric ulcer, and the chemical findings show excess of free hydrochloric acid, but it cannot be said with certainty that cancer has not arisen in a previous simple ulcer. In other cases there may be absence of free hydrochloric acid, and the patient lose ground under careful diet.

Four of these cases are on our records, and may be abstracted briefly. In the first two the tumour was nodular in character. The first case is mentioned in Osler's *Lectures on Abdominal Tumours* as M. G. on page 34. The second case is as follows :—

Three admissions; Diagnosis of Cancer on the first two; on the third Death and Autopsy; Gastric Ulcer.—L. F. (hosp. no. 9,473), male, aged 45 years, admitted first on March 22nd, 1894, complaining of dyspepsia and loss of weight. His family history was negative. He had used alcohol freely, and had had syphilis. His present illness began about six months before with pain and vomiting, which were present every day. The vomitus never contained blood, and was never large in amount. The pain was severe, situated in the epigastrium, and eased by pressure. His weight had fallen from 130 to 84 lbs.

Examination showed marked pallor and emaciation. No tumour was felt in the abdomen. Several test meals showed absence of HCl. No lactic acid was found. The hæmoglobin was 45 per cent., the red corpuscles 4,352,000 and the white 6000 per c.mm. The patient remained in the hospital for a month, and gained nearly 10 lbs., in weight, though the blood condition did not improve. No tumour was felt, but the sudden onset, persistent stomach symptoms, anæmia, and continued absence of HCl, all seemed to point to a diagnosis of malignant disease.

Second admission.—June 16th, 1894. The patient had been fairly well until two weeks before, when the pain and vomiting returned. He had vomited "coffee-grounds" material. The general condition was much the same. In the epigastrium there was marked tenderness just to the right of the median line. Between the navel and the right

costal margin a small nodular body was felt. The blood condition was unchanged. A faint reaction for HCl was got in the test meals. He remained in the hospital for six weeks, and gained 6 lbs., in weight. There was some doubt felt as to the correctness of the diagnosis of cancer.

Third Admission.—Sept. 11th, 1894. Since his discharge he had the same symptoms as before. On Aug. 26th he was kicked in the left lumbar region. Early in the morning of the next day he vomited half a wash-basin of dark blood. On Aug. 30th and Sept. 1st he vomited about the same amount, and also passed blood by the bowels.

Examination showed marked emaciation and pallor. The blood showed hæmoglobin about 12 per cent., red cells 1,012,000, and white cells 40,000 per c.mm. No mass was felt, but the abdominal walls were held tensely. The patient died suddenly on Sept. 13th.

Autopsy showed a large gastric ulcer on the posterior wall measuring 11 by 5 cm. It was old, cicatrised at the edges, and involved all the coats of the stomach. Perforation had occurred, but numerous firm adhesions had walled off the peritoneal cavity. The floor of the ulcer was formed by the pancreas. Ulceration had opened the splenic artery. A thrombus in the splenic artery had extended into the cœliac axis and abdominal aorta.

In both these cases the tumour, as felt, was nodular in character, and so they might perhaps have better been given under the second heading of small nodular tumours, but it seemed more convenient to quote all together here.

In the other cases the tumour was larger and involved more of the stomach wall.

Gastric Tumour; Diagnosis of probable Carcinoma; Operation; Pneumonia; Autopsy.—J. C. (hosp. no. 20,039), male, aged 57 years, admitted July 17th, 1897, complaining of pain and dyspepsia. There was nothing of note in his family or previous history. He had suffered from stomach trouble for eight years, with occasional attacks of gastric distress followed by vomiting. These occurred irregularly, perhaps once or twice a month. One year before admission these became much worse. They were more frequent and more severe. Of late he had vomited once or twice every day. The vomitus was the food previously eaten, and never contained blood. Pain was nearly constant, localised to the epigastrium, and made much worse by pressure. He had lost about 15 lbs. in weight, and much strength.

Examination showed emaciation and pallor. The abdomen was

somewhat excavated. There was marked visible pulsation which was curiously variable, at one time evident from the ensiform to the navel, again only in the upper epigastrium and again absent altogether. The abdominal walls were very soft, and the aorta could be readily handled and moved from one side to the other of the easily palpated vertebral column. In the epigastric and upper umbilical regions a hard rounded mass was readily felt, freely movable both vertically and transversely. At times there was a suggestion of change of consistency in the mass. Its position varied from day to day. After inflation of the stomach it was moved to the right of the median line. After inflation of the colon the tumour was not to be felt. The stomach was somewhat enlarged. Test meals always showed the presence of free HCl. There was anæmia; hæmoglobin 57 per cent.

The patient's condition did not improve. Under diet and lavage the vomiting ceased, but the pain persisted. He lost slightly in weight. An exploratory operation was advised. The diagnosis was in doubt, but notwithstanding the presence of HCl, carcinoma seemed most probable.

Operation (Dr. Finney). The tumour mass was found to be on the posterior wall 4 cm. from the pylorus. It was about 4 cm. in diameter. The stomach was opened near the lesser curvature. The mass was very hard, cup-shaped, and ulcerated. It was doubtful whether it was malignant or not, and the doubt was not removed by the examination of a frozen section of gland while the operation was proceeding. There were many enlarged glands in the region of the stomach. Removal was deemed unadvisable, and the wound was closed. The patient died of broncho-pneumonia four days after the operation.

Autopsy showed a gastric ulcer with marked thickening around it. The edges were sharp and punched out.

The fourth case showed many similar features.

Pyloric Obstruction; Dilatation; Cicatricial Ulcer; Operation; Autopsy.—H. L. (hosp. no. 23,138), male, aged 43 years, admitted June 20th, 1898, complaining of indigestion. He had stomach trouble all his life, and five years ago it had become severe enough to compel him to give up heavy work. For four years he had used the stomach-tube at intervals, and had noticed that he frequently washed out food eaten days previously. Two years before admission, while at work, he felt nauseated and vomited about one pint of dark blood. Two hours later a second hæmorrhage occurred on the way home, and a third after reaching home. The blood in the last was redder than in the first. He afterwards passed blood in the stools. For two months after this he felt much better. There had been no subsequent

hæmorrhages. Of late he had vomited large amounts at times. He had lost much strength, but little or no weight.

Examination showed a fairly nourished man. On inspection of the abdomen there was slight fulness in the epigastrium. Peristalsis was visible. About midway between the navel and right costal margin a distinct ridge-like mass was felt (fig. 21). The lower border of the stomach was below the navel. Test meals gave large amounts—once 300 cc.—with a normal acidity and free HCl present about ·12 per cent. The hæmoglobin was 100 per cent. The patient vomited frequently in spite of diet and lavage.

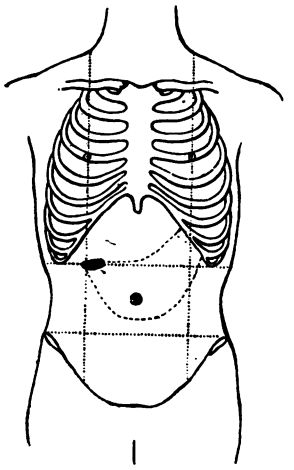

FIG. 21 (General No. 23,138).—The tumour and area of stomach tympany in one case of gastric ulcer.

A diagnosis of gastric ulcer with following cicatrisation and pyloric stenosis was made. Operation was advised.

Operation (Dr. Halsted). The stomach was dilated and the walls thickened. The region of the pylorus was contracted, and presented in front a distinct puckering which was surrounded by dense hard tissue. There were no adhesions, and removal was decided on. About half of the stomach wound was closed by silk sutures, and an end-to-end anastomosis done with the duodenum. The patient did not rally from the operation, and died two days later. The anastomosis showed perfectly tight closure. The removed portion showed a pyloric orifice about the size of a goose-quill. There was marked hypertrophy. No malignant disease was present.

These last cases show considerable similarity. In both there was a long history of stomach trouble—in itself against cancer, which, as has been noted previously, does not often follow chronic gastric disease. The third case had few features pointing to ulcer, the fourth gave a characteristic history. He felt much better after his hæmorrhages—a peculiar point not infrequently noted. As already said, a positive diagnosis may be impossible—even after the abdomen is opened. The history and chemical findings should be well considered. Thus, in the last case, with the amount of dilatation and stagnation present, had malignant disease been present, the typical chemical findings would have been obtained.

Hypertrophic Stenosis of the Pylorus.—The second condition referred to is comparatively rare. Special attention has been called to the diagnosis by Boas, who, in a recent article,[1] reports three cases and discusses the condition. The symptoms are those of stenosis, and of resulting insufficiency of the stomach. The diagnosis from malignant disease may be extremely difficult. The long history of many of the cases is an important matter. Boas points out the importance of the chemical findings, and, with Hammerschlag, lays emphasis on a steadily increasing disturbance of the motility—shown by repeated examinations at short intervals—suggesting strongly malignant disease. In simple stenosis no such rapidly advancing disturbances of motility are found. The history and frequent test meals are the surest means of avoiding error. Yet in some cases an element of doubt must always remain. No instance of this condition was present among the first 1,000 autopsies of this hospital.

II. **Tubular and Small Nodular Tumours.**—These compose a group which figures more frequently in the clinical than in post-mortem records. This is due in part to the tendency shown by pyloric tumours to invade the adjacent stomach walls, and, as already mentioned, palpation does not show the full extent of the mass. Of 24 cases of this series coming to autopsy, in only 3 was the growth strictly limited to the pylorus. The tumours of this group are usually recognised, although repeated examinations may be necessary. They are often situated below the right costal border in the parasternal line. They show many of the features previously noted, especially that of mobility. In

[1] *Archiv. f. Verdauungs-Krankheiten*, 1898, Bd. iv., H. 1.

fig. 22., **No. 98**, the mobility under varying conditions is shown. On several occasions no tumour was to be felt in this patient. While the edge of the liver may cover the tumour and render detection impossible, the post-mortems in this series indicate that this is not common. Inflation is at times of great service in their detection; the area of gastric tympany may be outlined exactly to the growth, and the gas may be felt or heard bubbling through it. There may be also definite changes in consistence. The question as to the possibility of palpating the normal pylorus has been discussed in the *Lectures on Abdominal Tumours*, and an affirmative answer given under certain conditions. Reference

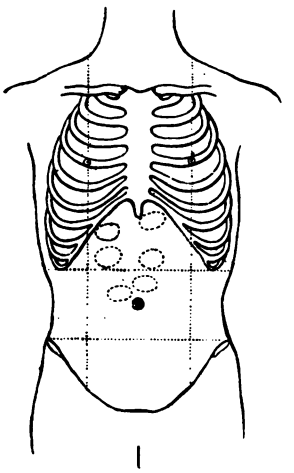

FIG. 22 (Case No. 98).—Showing extreme mobility of a pyloric tumour.

may be made here to an unusual case, referred to in the above-mentioned *Lectures* on page 38, with a tumour at the pylorus. We are able to give a recent report of his condition when the tumour was found to have disappeared.

Nodular Tumour in the Pyloric Region; Dilatation of the Stomach; Six Years later, Complete Disappearance of the Tumour.—J. A. R., male, aged 60 years, first seen Nov. 17th, 1891, when he gave a history of paroxysms of abdominal pain for ten months previously. Six months before admission he had noticed a small nodular tumour in the abdomen, which had gradually become larger. He had vomited only twice, and

had not any marked stomach disturbance. He had lost 14 lbs. in the past month.

Examination showed in the abdomen, just above and to the right of the umbilicus, a small movable tumour about the size of an English walnut. The stomach tympany, after inflation, extended two fingers' breadth below the navel. Free HCl was present in the test meals. He stayed in the hospital a couple of weeks, and gained weight.

Oct. 19th, 1892. He had been very much better, free from pain, no vomiting. He looked and felt well. Midway between the navel and right costal margin the same firm, hard nodule was felt. It descended with inspiration, and was freely movable. The stomach was still dilated, the lower border being found three or four fingers' breadth below the navel after inflation. The patient's general condition was good.

March 22nd, 1894. The patient was seen by Dr. Thayer, who noted: "The patient calls at the hospital to show himself. He looks well, and there is no emaciation. Just about the right parasternal line, 5 cm. from the navel, a hard nodular body is still distinctly to be felt. It does not appear to be as large as on the first note. It is freely movable, descends with inspiration, is firm and hard, not sensitive. There is no dilatation of the stomach. The liver is not enlarged, its edge is not palpable."

April 9th, 1898. The patient was seen by Dr. Osler, who noted: "The patient looks well, and has a good colour. There is no trace of the nodular body to be felt. The pylorus is not palpable."

As already stated, the tumour of gastric ulcer may resemble the small malignant growth at the pylorus, and two cases in point have been quoted. The pylorus may be involved in inflammatory conditions of adjoining organs, particularly the gall-bladder. In such cases a tumour mass may be felt, or the pylorus may be held by adhesions out of reach beneath the liver. Great dilatation of the stomach may be due to actual narrowing of the orifice, or there may only be stenosis due to the relative positions of the fixed pylorus and movable stomach, and indeed the orifice may not actually be reduced in size. The sagging stomach makes such an acute angle at the pylorus that little material can pass. The condition has been termed "stenosis by dislocation." A case showing these features may be quoted; although no tumour was felt, still the diagnosis of malignant pyloric growth was made.

Pylorus adherent to the Gall-bladder; Dilatation; Operation.—F. G.

(hosp. no. 7,892), male, aged 52, admitted Aug. 9th, 1893, complaining of abdominal distension and pain which had lasted for one year, and of loss of flesh for the past five months. He had previously been healthy. The main symptom had been dull constant pain in the right upper abdomen. This was eased by pressure, and he frequently sat at his desk with the right leg flexed on the abdomen. He had vomited frequently, but the vomitus never contained blood. Slight jaundice was noted for the first time shortly before admission. He had lost 30 lbs. in weight.

Examination showed sallowness, slight emaciation, and jaundice. There was visible peristalsis over the abdomen. The stomach was much dilated, the lesser curvature being at the umbilicus. No definite tumour was felt, and the outline of the stomach seemed to point to the pylorus being close to the liver. There was marked gastric insufficiency, and the stomach contents showed absence of HCl. No lactic acid was noted.

The diagnosis of probable cancer of the pylorus was made, and operation advised. The stomach was found greatly dilated and displaced. The pylorus was attached to the liver and gall-bladder by adhesions in which it was embedded. A gastro-enterostomy was done. On opening the stomach the pylorus felt hard and the finger could not be passed through it. The patient did not rally, and died on the third day.

Autopsy showed that the pylorus was embedded in a mass of adhesions, and was firmly united to the gall-bladder. On opening the stomach the pylorus was not found stenosed to any marked extent. The walls of the gall-bladder were thickened. In the gall-bladder was a stone weighing 13 grammes. All the ducts were patent. The liver just above the gall-bladder was indurated and contracted. A tumour may be palpable in this condition, as in a case reported by Elsner.[1]

Large Nodular Growths.—These show no special features apart from their size. From their position and extent, such tumours are not likely to escape observation. It is often difficult to decide as to the exact size, and the prominent nodular portion may be so readily felt that adjoining less marked areas pass unnoted. A case may be given in which on first examination a large nodular tumour was freely movable, while some months later it had become fixed by adhesions.

No. 72. *Very movable Pyloric Tumour, which became fixed subsequently.* —E. B. (hosp. no. 10,120), female, aged 58, admitted June 14th, 1894,

[1] *Medical News*, Feb. 5th, 1898.

complaining of abdominal distress. Her present illness dated back one year. She first had feelings of distension and pyrosis. She had lost much in weight. She had only had an occasional twinge of pain, and no vomiting.

Examination of the abdomen showed marked distension to the left of the navel, over which slight peristalsis was visible. To the right of and below the navel was a freely movable mass This was large, nodular, firm and hard. It was very movable, and was evidently at the pylorus. The test meal showed absence of HCl. and the presence of lactic acid.

The patient was seen four months afterwards. There had been more pain. The mass had increased somewhat in size. It was no longer movable, and was situated just above the umbilicus.

Reference has already been made to the extreme mobility of some large pyloric growths.

CHAPTER X.

STUDY OF THE TUMOUR (continued).

TUMOURS OF THE STOMACH WALL—GENERAL FEATURES—TUMOURS OF ANTERIOR WALL—TUMOURS OF POSTERIOR WALL—MASSIVE TUMOURS OF WALL—TUMOURS FOUND AT AUTOPSY, BUT NOT RECOGNISED DURING LIFE.

General Features.—Tumours of the stomach walls which do not involve the cardiac and pyloric regions compose about 20 per cent. of the total number. About one-half of these are situated on the lesser curvature, involving the anterior and posterior walls to a varying extent. Tumours of the wall show no special peculiarities from their situation. From their position, latency might be expected more frequently than when the orifices were involved; but of the eight latent cases of this series, the growth was situated on the walls in only three. When the growth is situated on the anterior surface the diagnosis is comparatively easy, save, of course, in the form with soft fungoid characters. In a recent case with this condition of a large portion of the mucous membrane, it was difficult to feel anything, but the diagnosis was confirmed during life by the recognition of tumour particles obtained through the stomach-tube. Of the 14 cases in which a tumour was found at autopsy but not during life, there were 4 in which the tumour was on the stomach wall. Of these in 2 the growth was on the lesser curvature, one being latent, the other having been diagnosed as cancer, although no tumour in the stomach was felt. A secondary nodule in the omentum was felt during life. In the other two cases the growth was situated in the posterior wall. In both these cases perforation had occurred, but had given rise to no symptoms. In the first the perforation was closely walled off by adhesions, and no peritonitis had been set up. In the second, numerous

secondary nodules were felt, but no stomach tumour. Perforation had occurred with adhesions to the left lobe of the liver, which contained a large cavity in communication with the stomach. These cases will be referred to elsewhere.

Tumours of the anterior wall of the stomach are not apt to escape recognition. They are generally situated in the left epigastrium and left hypochondrium. In some instances they are behind the left costal border. Secondary changes in the stomach are not usually found with them, and their position is fairly constant. Yet, in **No. 107**, which has already been referred to under "Mobility," they may show much variation in position. Inflation of the stomach may be of considerable help in determining the presence and situation of the tumour. Caution should be exercised in drawing conclusions as to the extent of the growth from the apparent size as felt through the abdominal wall. A case of growth of the anterior wall and greater curvature may be quoted:—

No. 24.—B. S. (hosp. no. 3,306), male, aged 62, admitted June 17th, 1891. During the war of secession he had suffered much from stomach trouble, nausea, vomiting, etc. These symptoms had not troubled him much for many years until the present illness, which began a year and a half ago. Since then he had pain, loss of appetite, and gradual decrease of weight and strength. There had not been any vomiting.

Examination showed in the left epigastrium a small irregular mass, which moved with respiration. The test meal showed the absence of HCl and the presence of lactic acid. He remained in the hospital for two months, during which time the tumour gradually increased in size. On discharge it extended to the median line in the epigastrium, was not tender, and was quite irregular. Death occurred six months later, and at autopsy a tumour was found about the middle of the greater curvature. It was about 5 cm. in diameter, and involved all the coats of the stomach.

A characteristic case is the following:—

No. 61.—W. S. (hosp. no. 8,674), male, aged 61, admitted Nov. 22nd, 1893, complaining of a mass in the abdomen. The family history was tuberculous. For many years he had belching of gas after food, but no other stomach symptom. The history of his present illness was rather unusual. About four months before he noticed that he was rapidly losing strength. Two months later he discovered a mass in the abdomen, which gradually increased in size. He had only vomited

once, and that was three months before admission. There had been little pain. He had lost over 40 lbs. in weight.

Examination showed pallor and emaciation. On inspection of the abdomen there was fulness below the left costal margin, and a mass could be seen to descend on inspiration. Communicated pulsation was visible. On palpation a hard nodular mass was felt which came from below the costal margin, and resembled the spleen very closely (fig. 23). After inflation the lower border of the stomach extended to within two finger-breadths of the navel. The tumour was more prominent, and its lower border came nearly as low as the stomach tympany. No peristalsis was visible. The note over the mass was tympanitic.

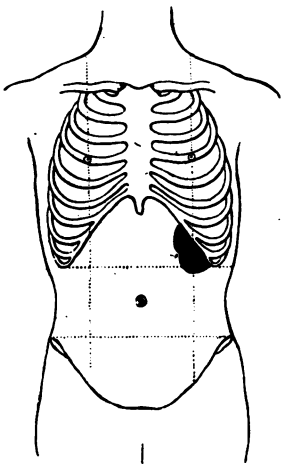

FIG. 23 (Case No. 61).—Showing the tumour of the stomach wall, simulating a spleen.

While tumours of the posterior wall are more likely to escape recognition than those elsewhere, yet they may be very readily felt, as in the case given below, where the tumour was very evident, and showed great mobility.

No. 134.—A. M. (hosp. nos. 19,197 and 19,833), male, aged 47, admitted first on April 17th, 1897, complaining of pain in the stomach. The present illness began with severe abdominal pain, which recurred at times, until on admission it was nearly continuous. On examination of the abdomen there was a nodular resistant mass opposite the cartilages of the 6th to 8th ribs on the left side. This descended on respiration at times to the level of the navel. The tumour was very

movable, and shifted its position when the patient turned on his side. It showed transmitted pulsation. After inflation the mass was moved to the right. It measured 5 by 4 cm. At times it was almost sausage-shaped, and lay in the median line.

The patient was discharged on May 18th, and readmitted on June 26th, 1897. He had been well for a time, but the severe pain had returned. The mass was present in the median line. It showed slight peristaltic waves, and at times was felt to contract and relax. Blood was vomited on one occasion. Operation was advised, and agreed to.

Operation (Dr. Finney), July 10th, 1897. A growth was found on the posterior wall of the stomach, and numerous metastases in the lymph glands. Removal was not attempted. The patient recovered rapidly from the operation.

A case of tumour of the posterior wall, due to gastric ulcer, which was readily palpable, has already been given.

Another case of much interest may be quoted in which, in spite of a very large liver with secondary growth, a tumour of the posterior wall was felt, which was adherent to the pancreas.

No. 91.—S. K. (hosp. no. 12,976), male, aged 56, admitted June 6th, 1895, complaining of pain and general weakness. His illness began suddenly nearly a year before, with nausea and vomiting. The vomitus contained large amounts of blood. Pain in the epigastrium came on soon after this, and he rapidly lost strength. Three months before he noticed that there was a mass in the abdomen.

Examination showed marked emaciation and pallor. The upper part of the abdomen was filled by a large rounded mass, which descended with respiration and was continuous with the liver. To the left the free margin was felt opposite the tenth rib. Below this prominent mass there was a deeper mass which was readily felt (fig. 24). It was in the umbilical region, and was rather to the right of the median line. This mass had an irregular outline, and the note over it was tympanitic. The patient gradually lost ground, and died on July 12th, 1895.

Autopsy showed that the large mass was the liver. The stomach was moderately dilated. On the posterior wall was a large oval mass, 8 by 12 cm., with sharply defined edges, which were raised in places. The centre was ulcerated. Opposite this there were firm adhesions to the pancreas and colon. The pancreas was infiltrated, and the colon much thickened.

It is of interest to note that a tumour of the posterior wall may be felt after inflation, which might be supposed to interfere with palpation. Case **No. 134**, already quoted, illustrated this point.

Massive tumours of the Walls.—There are cases in which the extent of infiltration forms a tumour of unusual size, filling the upper part of the abdomen or occupying a large area in the left hypochondrium. In the *Lectures on Abdominal Tumours* Dr. Osler gives two cases at length. In **Case 23** of that series, the mass had been diagnosed as probably renal by one physician, and by another as possibly a large phantom tumour in an hysterical

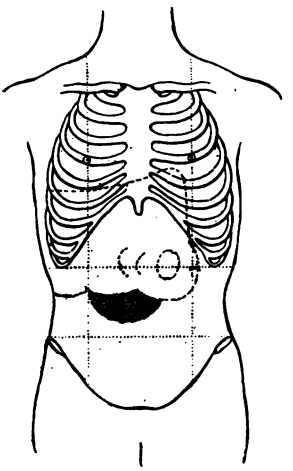

FIG. 24 (Case No. 91).—The upper outline is that of the liver. The lower shaded area is the palpable tumour.

woman. The mass occupied a very large area. To the right it extended 2·5 cc. beyond the navel and about the same distance below. A sharp edge passed to the left, to a point 4 cc. above the anterior superior spine of the ilium, and this edge could be traced upwards to the tip of the last rib. It passed beneath the costal border, and on inspiration descended three fingers' breadth. It was superficial, firm, and not tender. Behind there was a distinct margin to be felt, but it did not pass deeply into the renal region. There was resonance over the right side of the mass. There had been very few stomach symptoms, but subsequently there was much vomiting and signs of sloughing and

necrosis of the tumour, which, with the rapid emaciation and cachexia, left no doubt as to the nature of the trouble.

The mass may be mistaken for an enlarged and dislocated spleen, and the error has been discovered after a laparotomy.

In the following case, seen with Dr. Crowel, of Lincolnton, N.C., the symptoms of cancer of the stomach were most characteristic, and the patient was profoundly anæmic and cachectic.

An enormous mass, feeling quite superficial, occupied the lower epigastric and upper umbilical regions, extending almost from one costal border to the other. It was quadrilateral in shape, in about the

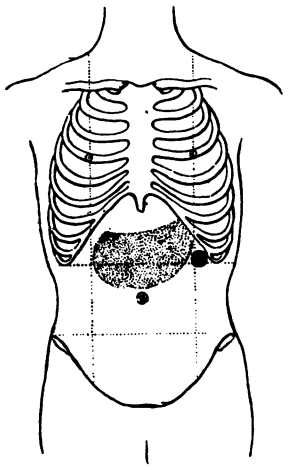

FIG. 25.—Showing a large, massive tumour of the wall.

position shown in fig. 25. At the left costal border there was a nodular mass feeling like a bunch of enlarged lymph glands. Pulsation was communicated through the mass. At first it did not seem possible that this could be a stomach tumour. It was everywhere resonant, clapotage could be obtained over the whole mass, and gurgling could be felt and also heard everywhere over it. It is possible, of course, that the omentum may have been involved and adherent, but there seemed very little doubt, from its superficial character and the resonance and the gurgling and the general symptoms, that it was in the stomach.

Tumours of other organs may give rise to difficulty in diagnosis. There is only one such case to report in connection with this

series, in which the enlarged abdominal lymph glands formed a tumour thought to be gastric.

Gastric Symptoms; Tumour in Upper Umbilical Region; Death; Autopsy; Enlarged Lymph Glands pressing on the Duodenum.—M. M. (hosp. no. 14,326), female, aged 42, admitted Oct. 28th, 1895, complaining of epigastric pain and diarrhœa. There was a marked tuberculous family history. She had been fairly healthy, though for some years she had occasional attacks of gastric distress, with which, however, there was no vomiting. The present illness dated back about six months. She first had pain in the epigastrium, which increased in severity. With this vomiting soon began, and was frequent. The vomitus soon became watery and large in amount. With the pain and vomiting she lost much weight—nearly 40 lbs. She never vomited blood or passed any by the bowel. Five months ago diarrhœa began, and since then she had six to seven watery stools a day. For a month before admission the pains had been very severe and nearly constant.

Examination showed great emaciation and pallor. The abdomen was scaphoid, and above the navel there was a visible prominent swelling, which moved with respiration. The mass could be felt beyond the navel, and extended obliquely upwards and to the left. It seemed to vary in size. After inflation there was distinct distension in the epigastrium, but no change in the position or character of the mass. On the following day the mass could not be felt. The patient was so weak that the stomach-tube could not be passed. The vomitus did not show HCl.

The patient vomited frequently, the diarrhœa continued. She sank, and died on Nov. 18th, 1895. A diagnosis of cancer of the stomach was made.

Autopsy showed tabes mesenterica. There was caseous tuberculosis of the mesenteric, retro-peritoneal, peri-pancreatic and hepatic lymphatic glands. Latent tuberculosis of the apex of the left lung was found. The stomach was somewhat dilated, but otherwise normal. The mass of enlarged glands pressed on the duodenum.

Tumour found at Autopsy, not detected during Life.—In 14 cases of the series no tumour was found on examination, but the post-mortem revealed its presence in some part of the stomach. The cases may be divided into those in which the diagnosis was made on the general and local symptoms, and those in which the symptoms of cancer of the stomach were masked and the condition was latent.

So important is this group that it is worth while to give an analysis of the cases.

Tumours of the Pylorus—4 cases.

No. 8, stomach not dilated ; no tumour felt after several examinations. Post-mortem showed an open cancer at the pylorus, extending 7 cm. from it. In the middle of the ulcer there was a yellowish slough, beneath which there was a small cavity between the stomach and pancreas. There was no narrowing of the pyloric orifice.

In **No. 15** the diagnosis of cancer of the stomach was made on the history, the symptoms, and the presence of cachexia. No tumour could be felt. The patient died outside the hospital. A cancer at the pylorus was found.

In **No. 29** an enlarged liver completely covered the stomach. There was a mass at the pylorus, but no stenosis and no dilatation of the stomach.

In **No. 31** a diagnosis was made on the history and condition of the stomach juices. There was moderate dilatation, but no tumour could be felt at any time. Postmortem there was a hard, firm mass at the pylorus, and the glands were also involved, making a mass the size of a hen's egg.

Two of the latent cases, **No. 63** and **No. 124**, had tumour at the pylorus and lesser curvature, which were not noticed during life.

In **No. 11** the diagnosis of cancer of the œsophagus was made. There was no tumour felt in the abdomen. The entire stomach was involved, much contracted, and the growth extended 7 cm. into the œsophagus.

There were two with tumours at the **cardiac orifice**. One, **No. 22**, was latent, and the diagnosis of chronic nephritis was made. A mass was situated at the cardiac orifice, and extended into the œsophagus. The other, **No. 32**, had great difficulty in swallowing, and was thought to be cancer of the œsophagus. The stomach was opened, and carcinoma was found at the cardiac orifice, extending into the gullet.

Of two with tumours situated in the lesser curvature, in one, **No. 71**, the patient was thought to have pulmonary tuberculosis. There were no symptoms pointing to the stomach. At autopsy there was a fungoid mass projecting from the lesser curvature. In the other case, **No. 75**, the glands above the clavicle were enlarged, and the pain in the abdomen and vomiting were very suggestive of cancer, but no mass was felt. Post mortem nearly

the whole of the lesser curvature was involved in a large ulcerating mass.

In two cases the tumour was situated in the middle of the posterior wall. **No. 68** had a well-marked history. On the posterior surface, 4 cm. below the lesser curvature, was a cancerous ulcer, in the centre of which was a perforation covered by adhesions. There was general involvement of the peritoneum. In **No. 92** numerous nodules were felt in the epigastrium, which were probably those in the peritoneum. No stomach tumour was felt. There was an ovoid cancerous ulcer on the posterior wall.

CHAPTER XI.

THE BLOOD IN CANCER OF THE STOMACH.

RED BLOOD-CORPUSCLES: COUNTS IN FIFTY-NINE CASES—HÆMOGLOBIN: ESTIMATIONS IN FIFTY-TWO CASES—LEUCOCYTES, WITH DIFFERENTIAL COUNTS—DIGESTION LEUCOCYTOSIS—CANCER OF THE STOMACH SIMULATING PERNICIOUS ANÆMIA.

COMPARED with other data, the information to be obtained from an examination of the blood in gastric cancer is of slight value. The relationship between stomach conditions and blood changes is in many points obscure. A study of the blood may be all-important, especially in cases which show a marked likeness to pernicious anæmia, particularly in the early stages of the disease, when the diagnosis is so often doubtful. We shall give first the results of the blood examinations which were made in the present series of 150 cases. The blood, as a rule, shows the characters of a secondary anæmia. Cases which present a normal or even a high blood count are usually those with obstinate vomiting, or with a constant secretion of fluid into a dilated stomach. Even with great emaciation the blood count may be high.

I. **Red Corpuscles.**—There were accurate counts in 59 cases. The average number was 3,712,186 to the cubic millimetre —a high blood count when it is remembered how many of the cases were far advanced or cachetic. The following table gives the counts in each million, with the number of cases that came to autopsy, and the number of these showing ulceration:

Number of Corpuscles.	No. of cases.	Autopsies.	Ulceration.
Over 6,000,000 . . .	3	0	0
From 5,000,000 to 6,000,000 .	7	2	1
From 4,000,000 to 5,000,000 .	17	4	2
From 3,000,000 to 4,000,000 .	16	3	3
From 2,000,000 to 3,000,000 .	8	3	3
From 1,000,000 to 2,000,000 .	8	1	1
Below 1,000,000 . . .	0	0	0

Twenty-seven cases, nearly one-half of the total number, have a blood count above 4,000,000 red corpuscles, and only 16, or 27 per cent., are below 3,000,000. The highest count, 6,600,000 per c.m., was in a very acute case with protracted vomiting. The next highest, 6,120,000, was in a much-emaciated patient with a very dilated stomach. Of the cases below 2,000,000—8 in number—only 2 had a count below 1,500,000. The lowest count, 1,168,000 to the cubic millimetre, was taken six days before death, and the autopsy showed an ulcerated growth, involving nearly the whole of the lesser curvature, measuring 9½ by 10 cm. The other case, with a count of 1,200,000 to the cubic millimetre, and showing many of the features of pernicious anæmia, will be referred to again.

Improvement in the blood condition was not common. Many of the cases during their stay in the hospital held their own or gained slightly, but marked gain was not observed. This might be of assistance in a doubtful case, as rapid improvement under treatment would be against a diagnosis of gastric cancer On the other hand, a loss in the blood condition was rarely marked. In one case the count on first admission was 4,160,000, and two months later, on readmission, the red corpuscles had fallen to 1,728,000. The hæmoglobin fell from 45 to 19 per cent. during the same time. The average count in 21 fatal cases—the last count before death being taken—was 3,230,000 to the cubic millimetre.

A study of the blood is of great importance in the diagnosis from pernicious anæmia. F. P. Henry,[1] who has called attention to its great value, states that he has never seen a case of stomach cancer in which the red corpuscles were below 1,500,000 to the cubic millimetre (there were two in this series), and never any case of pernicious anæmia coming to a fatal issue in which they were not below 1,000,000. He well remarks that in stomach cancer the diminution in red corpuscles does not keep pace with the cachexia, while in pernicious anæmia the cachexia holds no pace with the oligocythæmia.

Polycythæmia is found in two conditions, namely, persistent vomiting and constant secretion into the dilated stomach. With either, diarrhœa may be a contributing factor. The highest count in this series, namely, 6,600,000 to the cubic millimetre,

[1] *Archiv für Verdauungs-Krankheiten*, Band iv.

was with the first (vomiting); with the second the highest count obtained was 6,120,000 to the cubic millimetre.

Examination of Stained Specimens.—With marked anæmia the red corpuscles showed the usual characteristics—a moderate degree of variation in the size, and some poikilocytosis. In the more severe cases nucleated reds were found, either normoblasts or forms midway between them and megaloblasts. In no case where stained specimens were examined is there any record of a typical megaloblast having been found—a point of importance in the diagnosis from cases of primary pernicious anæmia.

II. **Hæmoglobin.**—In 52 cases the average percentage of hæmoglobin (Von Fleischl instrument) was 49·9, a low record in proportion to the average number of red corpuscles—namely, 3,712,186. These two averages give a colour index of 0·63. In nearly one-half of the counts the red corpuscles were 4,000,000 or over. Taking even 70 per cent. as an equivalent amount of hæmoglobin, we find that rather less than one-fifth were above this figure. The following table is of interest:

Percentage of Hæmoglobin.	No. of cases.	Autopsies.	Ulcerations.
80 or over	3	1	0
70 to 80	7	2	0
60 to 70	6	0	0
50 to 60	5	2	1
40 to 50	8	3	2
30 to 40	14	3	3
20 to 30	7	1	1
Below 20	2	1	1

Of the three cases with more than 80 per cent. of hæmoglobin, two had above 5,000,000 red corpuscles; the third was only a few thousands short of the same figure.

Of the influence of ulceration of the growth on the blood condition, no conclusions can be drawn from so few cases; but it will be noticed that the cases with the lowest records of red corpuscles and hæmoglobin nearly all showed ulceration.

III. **White Blood-corpuscles.**—There are records in 62 cases. An increase in the number of leucocytes is variously estimated to occur in from one-third to one-half of the cases. Taking 8,000 to the cubic millimetre as the maximum of normal, there were 29 cases, or nearly half, with counts below this. There were 3 cases with leucocytes below 4,000, the lowest count being

3,300, in a case which presented no special features except a low red count—namely, 1,678,000. The highest count, 28,000, occurred in a case with extensive secondary involvement of the liver; otherwise there were no features to account for the leucocytes.

The accompanying table gives the number of cases with counts between certain figures, the number of autopsies, and the occurrence in these of ulceration and metastases.

TABLE OF LEUCOCYTES.

Number of Leucocytes.	No. of cases.	Autopsies.	Ulceration.	Metastases.
Below 5,000	14	3	2	2
5,000 to 8,000	15	3	2	3
8,000 to 12,000	15	3	2	2
12,000 to 20,000	15	4	3	4
20,000 to 30,000	3	2	2	2

Of the cases between 5,000 and 8,000 none were over 7,500, so that this seems to form a convenient division between the normal and increased numbers.

Neither ulceration nor the presence of metastases appears to have any direct bearing on the leucocytosis, since in the cases that came to autopsy ulceration and metastases were about as frequent in cases with normal as with an increased number of leucocytes. The situation of the growth did not seem to have any influence on the number of leucocytes. The relation of the temperature and the number of leucocytes is shown in the following table:

Temperature.	Number of cases.	Number of counts.	Leucocytes below 7,500.	Leucocytes 8,000 to 12,000.	Over 12,000.
Normal	53	20	11	5	4
One brief rise	5	1	0	0	1
Subnormal	9	5	3	1	1
Slight rise, below 100°	23	8	5	3	0
About 100°	20	7	4	2	1
100° to 101°	18	10	2	2	6
101° to 102°	5	3	1	0	2
102° to 103°	6	1	0	1	0
Over 103°	2	1	1	0	0

From this it will be seen that both with normal and with

elevated temperatures we have a normal and an increased number of leucocytes. Among 110 cases in which the temperature was not above 100°, of 41 cases with counts there were 18 showing leucocytosis. Among 31 cases showing some fever there were, of 15 counts, 11 showing leucocytosis. These gave percentage figures of 44 in non-febrile cases and 73 in febrile cases respectively as having leucocytosis—a marked difference, and speaking, to some extent, for a connection between the two conditions.

The counts given above were the average ones. In 7 cases there was some change in the numbers, in all but one an increase. No definite cause could be found for this, but one of them had chills with elevation of temperature.

Stained Specimens of Leucocytes.—There were no special peculiarities other than those of a secondary anæmia. Accurate differential counts were made in 22 cases of the series. The results are given in tabular form, the average figure for each class being given. The classification used is that of Ehrlich, and it may be mentioned that the dividing line between the large and small mononuclears, so far as size is concerned, was the average size of the polymorphonuclear leucocytes.

TABLE OF DIFFERENT COUNTS OF LEUCOCYTES.

Number of Leucocytes.	Number of cases.	Polymorphonuclears.	Small mononuclears.	Large mononuclears and transitionals.	Eosinophiles.
Under 5,000 . . .	4	74·7	12·5	11·2	1·6
5,000 to 8,000 . . .	6	82·7	8·4	8·2	·5
8,000 to 12,000 . . .	6	76·2	11·5	10·1	1·7
12,000 to 20,000 . .	5	88·8	5	5·2	1
Over 20,000 . . .	1	85	5·1	7·8	1·5
Average of total . .	22	81	9	8·5	1·1
Average of cases below 8,000 . . .	10	79·5	10	9·3	1
Average of cases over 8,000 . . .	12	82·2	3·2	7·8	1·3

The cases with leucocytosis show a somewhat higher percentage of the polymorphonuclear forms, but the average difference is not as great as might have been expected. The cases with counts between 12,000 and 20,000 show the largest percentage. The relative number of large mononuclear and transitional forms as compared with the small mononuclear is

of interest, as some writers have thought that in carcinoma of the gastro-intestinal tract the former were increased at the expense of the small. Thus Sailer and Taylor[1] have published the counts in 22 cases, of which 8 were cancer of the stomach. In the majority of these there was an increase of the large mononuclear forms over the lymphocytes, and this was most marked in the cases without leucocytosis. Of course, in a question of this kind much individual difference may exist in regard to the classification of the various forms. But the results in the present series do not support this view. It will be seen, on referring to the table, that the figures for the two groups of mononuclear leucocytes are fairly close together, and instead of an increase of the large forms, especially in cases without leucocytosis, the contrary was the case. Judging from this series, the difference is not marked enough to be of any value in differential diagnosis.

Presence of Myelocytes.—These may be present in a very severe secondary anæmia. The statement has been made, for example, by Van Valzah and Nisbet[2] that myelocytes are frequently found in cancer of the stomach. In no case, however, in this series is there a note of a myelocyte having been found. There are, of course, differences of opinion as to what the term myelocyte includes. Cabot,[3] in an article on "The Myelocyte of Ehrlich," speaks of the difficulty of giving an accurate definition to cover all the forms. Certain small neutrophiles, which appear mononuclear, are perhaps most likely to give rise to differences in blood counts by different observers. Ehrlich[4] speaks of small forms of myelocytes with variations in size between them and an ordinary typical form. At all times one may see small polymorphonuclear neutrophile cells in which the nucleus may be tightly wound so as to be like or even assume actually a round shape. But the general structure is that of a polymorphonuclear neutrophile, and this is generally brought out by Ehrlich's triple stain or by a hæmatoxylin stain.

Digestion Leucocytosis.—Müller[5] and others have called attention to the possible importance of this sign in the diagnosis

[1] *The International Medical Magazine*, 1897.
[2] *The Diseases of the Stomach*, p. 537.
[3] *Boston Medical and Surgical Journal*, Jan. 2, 1896.
[4] *Die Anämie*. Wien, 1898.
[5] *Prag. med. Woch.*, 1890, Nos. 17, 18, 19.

of stomach disorders, the absence being held to be suggestive of cancer. Without a large number of statistics, not only in cancer but in other affections, some hesitation must be expressed in regard to the value of a digestion leucocytosis, especially in view of the figures given below.

In 22 cases in which an accurate record was obtained, digestion leucocytosis was present in 10 and absent in 12. In all the cases considered as showing digestion leucocytosis an increase of at least one-third of the number of leucocytes was given. Of the 10 cases with digestion leucocytosis, the diagnosis was confirmed by autopsy in 2, death occurred after a typical course in 2, in 2 cases cancerous masses were obtained by the stomach-tube, and in the remaining 4 cases there was a gastric tumour with other symptoms which excluded error in diagnosis. While the total number of cases is small, the large proportion with digestion leucocytosis raises doubt as to the value of its absence as a diagnostic sign of cancer.

IV. **Cancer of the Stomach simulating Pernicious Anæmia.**—In the onset and course a certain number of cases of carcinoma of the stomach resemble pernicious anæmia Gradually increasing pallor with loss of weight and strength, in many instances so insidious that no definite time could be stated, was present in 38 cases of our series. As in pernicious anæmia gastro-intestinal symptoms are common, so that the chances of error are considerable. The following cases are given in illustration :—

No. 132. *Shortness of Breath ; Pallor ; Gradual Loss in Weight ; Skin of a Lemon Tint ; Analysis of Gastric Contents favourable to Diagnosis of Cancer ; Examination of Blood favourable to Cancer.* — T. B. (hosp. no. 19,601), male, aged forty-six years, admitted June 31, 1897, complaining of weakness and nausea. His family history was negative. He had previously had occasional attacks of dyspepsia associated with diarrhœa.

The present illness began about February with breathlessness and lassitude. About March he noticed that his skin was yellow, and this had rather increased. After this he had occasional attacks of vomiting not associated with pain. He had lost about 40 lbs. in weight. He had not had hæmorrhages.

Examination showed a man who looked very ill but had not lost the subcutaneous fat. The skin was of a lemon-yellow colour. The gums and mucous membranes were very pale. In the right epigastrium

there was tenderness on palpation and the suggestion of a mass, but nothing definite was to be made out. One small, hard gland was felt above the left clavicle.

Blood: Hæmoglobin, 23 per cent.; red corpuscles, 1,200,000; leucocytes, 4,000.

The differential count was polymorphonuclears, 66·2 per cent.; small mononuclears, 17·5 per cent.; large mononuclears and transitionals, 11·7 per cent., and eosinophiles, 4·5 per cent. One nucleated red corpuscle was seen in counting four hundred leucocytes; this was rather larger than a normoblast. The red cells showed a moderate grade of poikilocytosis.

A second blood count gave hæmoglobin, 23 per cent., and red corpuscles, 1,280,000.

Test breakfast yielded 45 cubic centimetres of material, which showed absence of free hydrochloric acid and the presence of lactic acid.

The urine was clear; specific gravity 1,020; no albumin, no casts.

The patient improved slightly during a short stay in the hospital, and then insisted on going home. He lived outside Baltimore, and it has been impossible to get any trace of him.

The appearance of this patient suggested pernicious anæmia. The high colour-index of the blood was in favour of this also, but the absence of megaloblasts with anæmia of such a grade was against it. The stomach contents, the tenderness, and the suggestion of an epigastric mass, with the enlarged gland above the left clavicle, all spoke for the diagnosis of gastric cancer. Another point in favour of carcinoma was the progressive decline, which is rarely seen except in a few acute cases in pernicious anæmia, in which as a rule there are periods of improvement. In the following case, however, marked benefit followed a few weeks' treatment in the hospital, and made the diagnosis of cancer doubtful.

No. 146. *Indefinite Onset, Loss of Energy and Strength; Shortness of Breath and Increasing Pallor; Slight Stomach Symptoms; Diagnosis of Pernicious Anæmia; Gradual Improvement; Return of Stomach Symptoms; Nodular Mass in the Region of the Stomach.* —T. B. (hosp. no. 21,660), male, aged 45 years, admitted Jan. 7, 1898, complaining of indigestion and weakness. He had been previously healthy, had smoked heavily, and used alcohol moderately. For some years he had been a commercial traveller, and often got his meals irregularly.

The history of the present illness was indefinite. For above a year

he had not felt so well as usual. While "on the road" he had one or two attacks of slight indigestion and diarrhœa. Under treatment and rest this condition rapidly improved. About March 1897 he began to notice that he was easily tired, felt listless, and did not have any energy. There was marked shortness of breath on exertion. About May 1897 he noticed that he was growing very pale, and this has progressed. During the summer he had some belching of gas and discomfort in the abdomen, but no pain or vomiting. At times he had fever, and during September this was high. He then spent six weeks in bed. There had been at times œdema of the ankles. In October 1897 he consulted Dr. Osler, who found his blood count to be: Hæmoglobin, 30 per cent.; red corpuscles, 3,000,000. He was kept in bed and given arsenic. Under this treatment he improved, and by December went back to his office. But the symptoms of weakness and shortness of breath soon returned. The stomach symptoms also were rather worse, although he did not have any pain, nausea, or vomiting. He tried lavage, which improved his condition. It was noted that large amounts were always found in the stomach.

Examination showed marked pallor, with a somewhat muddy yellow tinge. He was not cachectic. The sclerotics had a pearly look. Emaciation was not marked. In the abdomen there was slight fulness in the epigastrium, but no mass was made out. Slight peristalsis was visible only after inflation.

Test Breakfast—Several were given, and the amount obtained was always large, varying from two hundred to four hundred cubic centimetres. The total acidity was usually about 50. Free hydrochloric acid was never found, and there was a marked reaction for lactic acid.

Blood.—Several examinations were made, all showing about the same result. Hæmoglobin, 25 per cent.; red corpuscles, 2,840,000 to 3,048,000; leucocytes, 11,500. The red cells in the fresh specimen showed slight poikilocytosis. In the stained specimens no nucleated reds were found. The differential count was practically normal. Digestion leucocytosis was absent.

It was learned from his physician, Dr. Harrison, of Roanoke, Virginia, that the patient died on April 22nd, 1898. Two days before death, after washing out the stomach, a hard tumour was felt, evidently in the stomach.

When this patient first consulted Dr. Osler, in October 1897, the history and clinical picture were those of a progressive pernicious anæmia. Still, the blood showed a relatively low hæmoglobin, and the absence of free hydrochloric and the

presence of lactic acid were very suggestive of new growth. He improved, however, rapidly in the hospital, and when he left we were in doubt as to the nature of the trouble.

In connection with these, a case may be mentioned in which the question of cancer of the stomach arose, but which afterward was proved to be pernicious anæmia.

Insidious Onset, with gradual Failure of Strength and Loss of Colour; Stomach Symptoms; Loss of Weight; Extreme Anæmia; Cancer of the Stomach suspected; Readmission with Profound Anæmia; Blood characteristic of Pernicious Anæmia.—J. K. (hosp. Nos. 10,136 and 10,261), admitted first on June 15th, 1894, complaining of weakness and vomiting. His family and previous histories were negative.

The present illness began insidiously about five months before. He noticed that he was growing pale and that he was having pain in the back. His appetite gradually failed, and two months before vomiting began. The vomiting was generally after food. The vomitus never contained blood. He had lost over 30 lbs. in weight.

Examination showed marked pallor and some emaciation. There was nothing of note found either in the thorax or abdomen. A solid body was felt below the left costal margin on deep inspiration, which was thought to be the spleen.

Test Breakfast gave 25 cubic centimetres of yellowish fluid, neutral in reaction, and containing neither free hydrochloric acid nor lactic acid.

Blood.—Hæmoglobin, 27 per cent.; red corpuscles, 1,048,000; white corpuscles, 4,400.

Stained specimens did not show any nucleated reds and no apparent increase in the lymphocytes (no exact differential count was noted).

He remained in the hospital for only three days, and the diagnosis was left open between gastric carcinoma and pernicious anæmia. He was readmitted two weeks later. The only new symptoms presented were œdema of the feet and increasing weakness; otherwise his condition had been much the same.

The blood examination showed on admission: hæmoglobin, 17 per cent.; red corpuscles, 918,000; white corpuscles, 4,800.

One week later it was: hæmoglobin, 19 per cent.; red corpuscles, 970,000.

Stained specimens showed a number of typical megaloblasts along with a few normoblasts. The differential count showed polymorphonuclears 68 per cent. and lymphocytes 29 per cent.

On August 15th the count was: hæmoglobin, 48 per cent.; red corpuscles, 1,908,000. Only two nucleated reds were found, one a

normoblast and the other a megaloblast. The differential count showed 34·4 per cent. of lymphocytes.

The patient was in the hospital until Oct. 12th, when his count was: hæmoglobin, 69 per cent.; red corpuscles, 3,600,000.

Stained specimens were practically normal. There were no nucleated reds, and lymphocytes were 17 per cent. of the leucocytes.

In the following interesting case the patient recovered from a profound anæmia, and six years later died of cancer of the stomach.

In Hospital six years before with Pernicious Anæmia; Gradual Recovery; Second Admission with loss in weight and vomiting; Presence of a Tumour in the Epigastrium and the characteristic features of Cancer of the Stomach.

W. M. (hosp. no. 16,611), who was admitted on July 9th, 1896, with gastric symptoms and a definite stomach tumour, had been in the hospital with pernicious anæmia six years previously. He was first admitted in 1890, when the diagnosis of pernicious anæmia was made. He then had a blood count of about 1,000,000 red corpuscles. After a stay in the hospital of eight months he was discharged with a red count of 4,900,000 and hæmoglobin 92 per cent. On a second admission for diarrhœa in 1892 his count was in the neighbourhood of 3,000,000. His general health was good. On his last admission he complained of "sick stomach." He gave a history of having been very well since his admission in 1892. The present trouble began only about one month before admission. He thought it had been brought on by his having drunk very cold beer when he was overheated. Vomiting began, which had been nearly continuous. Examination showed a gastric tumour, absence of hydrochloric acid, and presence of lactic acid in the stomach contents.

One or two additional points of interest may be noted. In a few cases of cancer the sallow lemon tint of the skin, so characteristic of progressive pernicious anæmia, is present. In **No. 33**, male, aged 69, while there was marked general anæmia, there was a curious distribution of yellow pigment over the skin. **No. 49**, too, presented a very yellow tint of the skin, which made us for a time suspect primary anæmia. In the case of J. R. C., aged 64, seen June 6th, 1896, with Dr. Baden, the anæmia was profound, and the whole appearance of the patient was that of a primary anæmia, the general tint of the skin being of a lemon colour. A well-marked tumour was present.

Emphasis may again be laid on the importance of accurate blood examinations, as without them the diagnosis must frequently be in doubt, while with them it is a very unusual case in which any doubt remains. In all our cases—except **No. 132**, which has been discussed—the relationship between the number of red cells and the percentage of hæmoglobin was typical of a secondary anæmia. The hæmoglobin was reduced proportionately much more than the red corpuscles. In pernicious anæmia it is rare not to find a relatively high-colour index. The blood examination is the more important as the gastric findings in pernicious anæmia may show absence of hydrochloric acid, and so possibly suggest the presence of malignant disease.

Conclusions.—1. In a doubtful case a blood count below 1,000,000 red blood-corpuscles is strongly in favour of pernicious anæmia.

2. While nucleated red blood-corpuscles are present in all very severe anæmias, megaloblasts rarely if ever occur in cancer of the stomach.

3. Neither an increase in the leucocytes nor special variations in the forms appear to be of any moment in the diagnosis of cancer of the stomach.

4. The presence or absence of digestion leucocytosis is too uncertain to be of much assistance in diagnosis.

CHAPTER XII.

COURSE OF THE DISEASE—LATENT CANCER.

THE STATISTICS OF DURATION OF SIXTY-THREE CASES—CONDITIONS UNDER WHICH IMPROVEMENT OCCURS—ACUTE CASES—CHRONIC CASES—LATENT CARCINOMA OF THE STOMACH—THREE GROUPS OF CASES, (*a*) WITH NO LOCAL FEATURES, (*b*) WITH THE SYMPTOMS OF AN ASSOCIATED LESION, (*c*) WITH METASTASES WHICH MASK THE PRIMARY DISEASE.

As a rule the progress of a case is steadily downwards, and the entire duration of the disease is rarely more than from a year and a half to two years. It is to be remembered that the duration of symptoms cannot be taken as synchronous with the occurrence of the growth, as will be referred to when we discuss the latent cases.

In 63 cases of the series it was possible to estimate the entire duration: in 48, under one year; in 15, above one year; in 3, above two years. More closely analysed, 16 cases ran a course from the first symptoms to death within three months; 17 cases died between the third and sixth months; 15 between the sixth and twelfth months. Of the 15 cases with a duration above one year 3 died between the twelfth and eighteenth months, 7 between the eighteenth and twenty-fourth months. The longest case lived slightly over two years and a half, the diagnosis being verified by autopsy.

Conditions under which Improvement occurs.—While the course is, as a rule, downwards, there are not infrequently periods of improvement, which we have known to occur under three different conditions. A change of diet, combined with lavage, is sometimes followed by a remarkable betterment in the symptoms, local and general. Excluding 24 cases in which the stay was too short for any special treatment, of the remaining cases, 31 showed signs of marked improvement.

Of these only 8 showed any special gain in weight; 3 increased 5 lbs.; 4 gained between 5 and 10 lbs.; 1 gained 19 lbs. In many instances, without any gain in weight, the general and local conditions were very much improved.

A second cause of improvement, which is seen more often in private practice, is the visit of an optimistic consultant. Some years ago a gentleman in the neighbourhood of Philadelphia had much distress after eating, progressive emaciation, anæmia and a well-defined nodular tumour on the lesser curvature of the stomach, which was only evident when the organ was full, or when he took a deep inspiration. He had been ill for some time, and had practically made up his mind that the disease was incurable. A positive diagnosis of chronic gastric catarrh by a most optimistic consultant was followed for a period of nearly three months by the most remarkable improvement in his general condition. As there was no particular change in the treatment, which had consisted of lavage and careful dieting, to the pronounced mental impression may reasonably be attributed a part at least of this change.

Thirdly, a most extraordinary improvement may follow an exploratory operation, as in the case reported by W. W. Keen and D. D. Stewart.[1] The patient, a physician, aged 35 years, after an exploratory laparotomy, in which the body of the stomach was found "much involved," gained rapidly, and four months subsequently weighed 178½ lbs., having about March weighed 115 lbs. About seventeen months following the first operation the symptoms had so far recurred that another exploratory operation was performed, after which he died of peritonitis. Two large, open, cancerous ulcers were found in the stomach. This case is, we believe, unique in the history of carcinoma of the stomach.

Acute Carcinoma of the Stomach.—This designation may be applied to the cases in which the disease runs a course within three months. There were 16 cases in our series. The following is the most acute case in the series (reported by Dr. Thayer, *J. H. H. Bulletin*, vol. ii., p. 162):—

Coloured man, aged 40 years; admitted Sept. 19th, 1891. While not infrequently subject to dyspepsia, and occasionally to what he termed bilious attacks, he had been actively at work as a coachman,

[1] *Transactions of the Association of American Physicians*, vol. xiii.

and, according to his employer, in his usual health until about three weeks before admission, when he began to have attacks of vomiting, which became more and more continuous, so that at last he could not keep anything on his stomach. The patient on admission was fairly well nourished; the mucous membranes were of a good colour. In the epigastrium, to the right of the median line, a nodular body about the size of an English walnut could be felt. He remained in hospital for ten days, and had most obstinate vomiting, and had to be fed by enemata. He became rapidly weaker and very emaciated. He rapidly developed the condition of polycythæmia seen in the cases with much vomiting; the red blood-corpuscles were 6,600,000, the white corpuscles 16,000, the hæmoglobin 103 per cent. The diagnosis of cancer of the pylorus was made. The patient died at his home on Oct. 3rd, and Dr. Thayer, who made the autopsy, found a scirrhous cancer of the pylorus without ulceration of the mucosa.

The rapidity of the course in patients under the age of 30 years has already been noticed. But on examining the ages of these acute cases we find them in all the decades, the oldest being aged 75 years. The onset was sudden in 7 of the cases, pain being the most prominent symptoms in 4, and vomiting in 3. The cases with a duration of from three to six months also occurred at varying ages, the oldest being 75 years. The onset was sudden in 5 of these.

Another case may be referred to in detail:

No. 29.—*Duration of Symptoms One Month, Tumour, Secondary Deposits in Liver.* G. C., male (hosp. no. 3,787), aged 55 years; admitted Sept. 4th, 1891, complaining of pain in the abdomen. He gave a marked family history of tuberculosis. He had rheumatism many years before, but otherwise was healthy.

Present illness began three weeks before, when he had been exposed and had slept in his wet clothes. There was no chill after this, but he had pain in the epigastrium and left chest. He lost his appetite, became rapidly weak, and had to give up his work in one week after onset. The pain had become very severe, coming on in paroxysms.

Examination showed a well-preserved man, no emaciation. The epigastrium was filled with a large mass, on the surface of which nodules were felt.

The patient progressed fairly well until Sept. 10th, when he suddenly vomited, became short of breath, and died soon after. The total duration of *symptoms* was about one month.

Autopsy showed carcinoma of the stomach with secondary deposits in the liver.

Chronic Cases.—In 3 cases the disease lasted more than two years. The longest duration was in a man aged 56, whose case attracted a good deal of attention, as he was a very prominent citizen of Baltimore. Dr. Osler saw him in March 1891. He had then been ill for more than a year with stomach symptoms, anæmia and emaciation. He came into the hospital on April 4th, and "in the epigastrium in the parasternal line there was a transverse ridge-like swelling, depressed by inspiration, and over which the fingers could be distinctly rolled." On several occasions he had considerable fever, and for a few days after admission to the hospital his temperature rose to between 103° and 104°. He looked very pale, though the anæmia was chiefly due to impoverished hæmoglobin, of which he had only 52 per cent. The red blood-corpuscles were above 4,500,000. He remained in hospital for three weeks, and did not improve. He was seen subsequently on several occasions, and he then fell into the hands of other physicians. The stomach symptoms were sometimes better, sometimes worse, and at times he was able to attend to his duties. In January 1892 Dr. Osler saw him again, which was just about two years from the onset of pronounced symptoms. The tumour mass had become very pronounced in the left hypochondrium, and could be plainly felt on deep inspiration. Death occurred on June 4th, 1892, and the autopsy showed an extensive carcinoma of the stomach.

In the following case the duration was two years and two months.

No. 24.—B. H. (hosp. no. 3,306), male, aged 62 years, admitted on June 17th, 1891, complaining of stomach trouble. His family history was negative. He had been through the war, at which time he had frequent attacks of stomach trouble, accompanied by vomiting and pain.

Present illness began over a year and a half before, with indefinite stomach symptoms and gradual loss of weight and strength. There had been frequent attacks of diarrhœa, but the stomach symptoms had not been severe.

Examination showed moderate emaciation. In the left epigastrium was a definite tumour mass. Test meals showed absence of free HCl and the presence of lactic acid. The patient remained in the hospital for two months. His condition was improved, his stomach symptoms were better and he gained a little weight. Death occurred in February 1892, after a duration of symptoms of two years and two months.

Autopsy showed a carcinoma at the middle of the greater curvature.

Latent Cases.—We have been very much interested in a group of eight cases in which the disease was unsuspected during life. As Welch remarks, it is rare to find cancer of the stomach in an apparently healthy man dying by accident. The latent cases are most frequently met in old persons, in whom the symptoms may be very slight, or absent, or they are mistaken for the ordinary dyspeptic complaints of the aged. Even after the most thorough examination it may not be possible to reach a diagnosis. In obscure cases, particularly with dyspepsia and emaciation, the possibility of latent carcinoma should be borne in mind.

There are three groups of cases :

1. A very small one in general hospitals, a very large one in almshouses and asylums, comprising cases in which the symptoms are those of a gradual enfeeblement without any indication of local disease—as Oliver Wendell Holmes puts it in the *One Hoss Shay*, "a general flavour of mild decay, but nothing local."

2. Cases in which, with an absence of gastric symptoms, the lesions of associated disease seem sufficient to account for the condition. In this group were five of our cases. In two the diagnosis of nephritis was made ; one had advanced pulmonary tuberculosis with pneumothorax, one showed profound anemia with multiple venous thrombi, and the fifth presented symptoms from a carcinoma of the cæcum. The following is a summary of these cases :

No. 22. *Diagnosis of Nephritis, Arteriosclerosis and Pleurisy; no Gastric Symptoms.*—A. G. (hosp. nos. 2,454 and 3,251), male, aged 61 years, first admitted Jan. 22nd, 1891, complaining of shortness of breath, and a history of dyspnœa, for some years. He had frequent attacks at night, and any ordinary exertion was difficult. With this he had had frequent cough. He had little appetite, and the bowels had been loose.

Examination.—Dyspnœa, cyanosis, and œdema. The arteries were very sclerotic. There was fluid in the left pleural cavity ; over 600 cc. were withdrawn. The heart's action was rapid, with gallop rhythm ; on Jan. 20th, 900 cc. were withdrawn from the left pleura, and the following day a friction-rub was heard in the left axilla. There were albumen and tube casts in the urine. The dyspnœa gradually lessened, and by Feb. 16th his condition was much improved.

The patient remained in the hospital until April 29th ; on discharge he was still slightly cyanotic, but the dyspnœa had gone. There was

slightly impaired resonance on the left side of the chest. There was nothing noteworthy about the abdomen. During his stay there were no gastric symptoms and the general condition of the patient improved.

Second admission, May 19th, 1891, three weeks later. He looked very ill, cyanosed, and with dyspnœa and hiccough. The pulse was scarcely perceptible. On May 23rd, 260 cc. of fluid were withdrawn from the left pleural cavity. His condition remained much the same until death, on June 5th, 1891. There was no complaint of any gastric symptoms. The temperature was practically normal during both admissions. There was no loss of weight on the second admission, and the nephritis and arteriosclerosis seemed to account for the symptoms.

Autopsy showed carcinoma of the stomach and œsophagus; there was an elevated tumour-mass 7 by 2 cm., which was half in the stomach. The centre was ulcerated. There was chronic diffuse nephritis, arteriosclerosis, aortic and mitral insufficiency, and chronic pericarditis. There was pleural exudate with a fibrinous pleurisy over an infarction in the right lung. There were no metastases. Thrombi were present in both sides of the heart and in the pulmonary artery.

No. 73. *General Œdema; Albumen, Granular and Hyaline Tube-casts in Urine, Rapid Emaciation; Vomiting at Onset, but none during his stay in Hospital; Diagnosis of Nephritis.*—T. C. (hosp. no. 10,234), male, aged 61, admitted June 26th, 1894, complaining of swelling of the legs. His family history was negative. He gave a history of an attack like the present twenty years ago, which lasted for two months. He then had both œdema and dyspnœa. In the last five years he had gradually lost over 40 lbs. His present illness began about five weeks before with persistent vomiting, which lasted for one week. Swelling of the legs then appeared, and the vomiting stopped. He was able to keep at work until four days before admission. His appetite has been good, and the bowels regular. Examination showed marked emaciation and fairly general œdema. There was slight dulness over the base of the right lung. The abdomen was distended, tympanitic in the elevated and dull in the dependent portions, but it was held so tensely that attempts at palpation were not satisfactory. The urine was of dark colour. Specific gravity 1012, showed a faint trace of albumen and contained hyaline and granular casts. The temperature was slightly elevated. The œdema increased, and the patient died on July 4th.

Autopsy showed a large scirrhous cancer involving nearly the whole of the stomach, and extending to the œsophagus. The organ was adherent to all surrounding structures. The growth extended through to the peritoneum at places. There were secondary growths in the glands and liver.

No. 71. *Tuberculosis and Pneumothorax, all the features those of Chronic Consumption; no Stomach Symptoms.*—J. A. (hosp. no. 10,050), male, aged 41 years, admitted June 7th, 1894, complaining of pain in the chest and cough. His family history was tuberculous. He had been very healthy previously. His present illness dated back about six months, though for some time before he had been troubled with a cough. This became worse; he had sharp pain in the left chest and several attacks of hæmoptysis. For five months he had diarrhœa, with the passage of mucus and blood in the stools. He has not had any appetite. There has been much loss of flesh. There was no history of any stomach symptoms.

Examination showed great emaciation. There was clubbing of the fingers. There were marked signs on both sides of the thorax, both on percussion and auscultation. Pneumothorax was present on the left side. The abdomen looked natural, was nowhere tender, and was negative on palpation. The temperature was only slightly elevated. The patient rapidly sank, and died on June 11th.

Autopsy showed cancer of the lesser curvature of the stomach with secondary growths in the lymph-glands and liver. The mass measured 6 by 5 cm. It was soft and fungoid in character. The pylorus was free. There was tuberculosis of both lungs with pneumothorax on the left side. Tuberculous ulceration of the large and small intestine was also found.

No. 64. *Multiple Thrombi of Superficial Cutaneous Veins; Profound and Progressive Anæmia; no Gastric Symptoms.*—G. N. (hosp. no. 9,131), male, aged 50, admitted Jan. 31st, 1894, complaining of weakness and pains in the arms and legs. His family and previous history were negative. The present illness, which began four weeks before, he attributed to exposure, wet and cold. He had a chill followed by fever, which lasted some days. Pains began in each leg and then in the arms. These were sharp, made worse by movement, and there was a great tenderness of the muscles on pressure. There was not any œdema, but great weakness. The appetite was poor. The bowels, were regular.

Examination showed no marked general change, except pallor and sallowness. The thorax was normal. On examination there was epigastric tenderness and marked resistance of the abdominal walls. Neither the spleen nor liver was enlarged. Many of the superficial veins of both the arms and legs were represented by firm hard cords. These thrombosed veins were somewhat sensitive. A portion of one of these veins in the arm was removed. The thrombus was soft, and could be squeezed out. Cultures made from it were negative. The chart shows the remarkable extent of the thrombosis (fig. 1).

Blood: Hæmoglobin 39 per cent.; Red corpuscles 2,300,000; White corpuscles 6,000.

On Feb. 10th œdema appeared in the left leg. Very many of the superficial veins showed thrombosis. The left foot felt as warm as the right. On Feb. 15th œdema began in the right leg. The left femoral vein could be felt as a firm cord.

The anæmia increased, the blood count on Feb. 16th being:—Hæmoglobin 22 per cent.; Red corpuscles 1,716,000; White corpuscles 29,000.

The differential count showed 89 per cent. of polymorphonuclears. No nucleated red corpuscles were seen.

The patient gradually sank, and died on Feb. 18th, 1894. His temperature was constantly somewhat elevated. There were no stomach symptoms.

Autopsy showed cancer of the pylorus with secondary involvement of lymph glands, gastro-hepatic, anterior mediastinal and supra-clavicular, and the liver. The mass occupied the lesser curvature, and did not involve the whole pylorus, so that the orifice was not narrowed. There were also multiple venous thrombi.

This remarkable case excited very special interest, more particularly the unusual number of thrombi in the superficial veins, and their association with great tenderness in the muscles. Though we spoke of the possibility of malignant disease, yet there was no positive evidence obtained. He was not given a test meal, as there were really no features whatever pointing to the stomach.

In the following case there was primary carcinomata of the stomach and cæcum, of which the latter only gave symptoms.

No. 126. *Multiple Primary Carcinomata of Caecum and Stomach; Symptoms all from the Growth in the Bowels; Operation; Autopsy.*—S. H. (hosp. no. 8,316), male, coloured, admitted Oct. 3rd, 1893, complaining of pain in the abdomen, associated with pressure from a tumour. He had been a heavy drinker, and for some years had had occasional dyspeptic attacks.

Present illness began four months previously with obstinate constipation. This persisted for about three months, and was followed by severe diarrhœa. The stools contained mucus, but no blood. There had been occasional pain in the umbilical region. He had vomited twice, but the vomitus had no unusual character. He had lost both weight and strength.

Examination showed a tumour about the size of a lemon midway between the navel and right anterior superior iliac spine. It was firm

and hard, freely movable but not tender. The epigastrium was frequently examined, but no tumour could be felt. The stomach was somewhat dilated, but no peristalsis was seen. Two test meals were examined; the first was 50 cc. in amount, neutral in reaction, and no HCl found; the second gave only 5 cc. of contents, with an alkaline reaction.

In view of the presence of the tumour of the bowel, an operation was advised. The growth was found to be in the cæcum. It was excised, and the ends of the bowel sutured in the wound. Death occurred six days later from acute general peritonitis.

Autopsy showed multiple submucous carcinomata of the stomach. The largest of the tumour masses measured $6 \times 5 \times 2\frac{1}{2}$ cm., and was on the greater curvature. It was somewhat movable, and almost polypoid in character. The other masses were smaller. Many of the lymph glands adjoining showed involvement. There was acute general peritonitis. There were thrombi in the pulmonary artery and in the femoral, popliteal and saphenous veins on the left side. From the histological characters of the growths Dr. Welch regarded the case as an instance of multiple primary carcinoma.

III. Cases in which the metastases completely mask the primary disease.

No. 106. *Parœsthesia in Feet; Symptoms of Ataxia; Gradual Paraplegia; Headache; Marked Pain in Neck; Development of a Tumour in the right side of the Pelvis; no Stomach Symptoms. Autopsy; Primary Carcinoma of Lesser Curvature of the Stomach; Secondary Masses in the Abdominal Glands, the Right Ilium and the Femur.*—J. W., male, white (hosp. no. 14,944), aged 40 years; admitted Jan. 10th, 1896, complaining of inability to walk and pain in the neck and legs. His history was negative, and he had been healthy until his present attack.

Present illness began about eight months before, with peculiar sensations as of "pins and needles" in the feet. In about two months the weakness in the legs had so increased that he was unable to walk. Sensation was almost absent in the feet. Headache and pains in the neck had been severe. There had not been any special stomach symptoms, although he had vomited occasionally.

Examination showed emaciation and marked pallor. The abdomen was practically negative in the upper part. A mass was felt deeply in the right iliac fossa, which was palpable per rectum and involved the bony parts of the pelvis. There was great wasting of the legs, with absence of the knee-jerks. Blood examination showed hæmoglobin 48 per cent.; red corpuscles, 2,432,000.

The patient had severe pain, which required large amounts of morphine. The tumour of the right pelvis increased in size. He lost ground in every way. In February he developed marked mental symptoms, with ideas of persecution, etc. Death followed on March 4th, 1896.

Autopsy showed primary carcinoma of the lesser curvature of the stomach. The stomach was of normal size, and on the anterior wall in the region of the lesser curvature was an area of new growth 6 cm. in diameter. There was no ulceration. Histologically, the growth was a colloid carcinoma. There were secondary growths in the abdominal glands and in the right ilium and femur. Unfortunately, the spinal cord was not examined.

No. 124. *Pains in the Right Arm and Right Side of Neck, with Wasting of the Muscles of the Right Arm; Inequality of the Pupils; Development of Nodular Masses on the Ribs; Diagnosis of Cancer, but primary disease not suspected; no gastric symptoms. Autopsy showed Cancer of Lesser Curvature of the Stomach; a Nodular Mass compressing the Brachial Plexus; Metastases in Tenth Dorsal and First Lumbar Vertebræ.*—G. K. (hosp. no. 17,993), male, aged 39 years, admitted Dec. 1st, 1896, complaining of pain through the right shoulder and back, with loss of sensation in the right forearm. His family history was negative. He had had malaria every year for eight years past, and pains in the shoulders and back, thought to be rheumatic. The most severe of these attacks was 18 months before, during which he spent two weeks in bed. Since then he had been very well and able to work. His occupation, an ironfitter, involved much heavy lifting. He never had any stomach or bowel trouble; at times for many years he has had shortness of breath on exertion.

The *present illness* began in August 1896, with coughing and profuse expectoration. Pain soon came on in the right side, close to the shoulder, and was severe enough to make him give up work. The cough soon left him, but the pain remained. It gradually went down the right arm. It was constant, and described as boring in character. It was worse on movement. About one week before admission he noticed a loss of sensation in the forearm, and at the same time he lost power in the right arm, so that since then he has not been able to use it. The pain and weakness has also extended to his back, so that he had difficulty in raising himself up in bed. The legs were not affected. There was no history of any injury. There had not been any stomach symptoms. The bowels had been constipated. He had lost nearly 20 lbs. in weight, and much strength.

Examination showed fair nutrition. The patient remained usually on the left side; he seemed to suffer much pain, and objected to changing

his position or sitting up, on account of the pain it caused. There were prominences on the fourth, fifth, seventh, eighth, and twelfth ribs, not attached to the skin, but to the bones. They were very tender, had a slightly elastic, but not fluctuated feeling. Examination of the thorax was negative. There was no dulness over the manubrium. The abdomen was flat, the muscles were held somewhat rigidly, so that palpation was difficult. There was marked wasting of the muscles of the right arm, and loss of power. There seemed to be some disturbance of sensation over the ulnar surface of the left arm, but the results were not constant. There was distinct inequality of the pupil, the left being larger. They both reacted to light and on convergence. Ophthalmoscopic examination was negative. The patient held himself very stiffly when asked to sit up, and the mobility of the head downward was much impaired. There was no pain on pressure over the spine. There was no general glandular enlargement. Blood:—Hæmoglobin, 92 per cent.; red corpuscles, 5,752,000; white corpuscles, 13,000.

The patient had severe pain, and frequently required morphia hypodermically. He lost weight and strength. The masses on the ribs gradually increased in size, and became more tender. On Dec. 26th it was noted that the abdomen was very tense, and moderately distended. No other abdominal symptoms were present. The leucocytes increased, and were 22,000 on the 26th. A differential count showed 85 per cent. of polymorphonuclear. The patient gradually sank, and died on Dec. 30th. During his stay he took nourishment fairly well. There was no complaint or sign of any gastric trouble.

The case was regarded as probably one of primary neoplasm in the thorax, with secondary deposits on the ribs and probably in the vertebræ. The absence of history of any gastric trouble and of any signs during his stay in the hospital, did not call for special attention to the stomach, and no test breakfast was given. The abdominal examination was always negative, except that the muscles were held tensely. As the patient was difficult to examine, this did not perhaps arouse the attention it should have done. The true condition was not suspected.

Autopsy showed cancer of the stomach. The lesser curvature was converted into a rigid mass over which the omentum was closely bound. The growth extended along the posterior wall. It did not involve the cardia or pylorus. On section all the coats were infiltrated. The mucous membrane was smooth, white, and opaque. Near the pylorus was an ulcerated area 3 by 3 cm. on the posterior wall. There were metastases in the lungs, bronchial, pericardial, axillary and

abdominal lymph-glands, ribs, skull, and vertebræ. There was compression of the brachial plexus by a tumour-nodule. The vertebral metastases were in the first and tenth dorsal and first lumbar.

No. 141.—*Onset of Illness with Ascites; two months later Aspiration of Bloody Fluid; Recurrence of Ascites with Swelling of the Legs; Drainage of Peritoneum; Recognition of Malignant Disease of the Stomach. Autopsy showed extensive Cancer of the Stomach.*—A. H., male (hosp. no. 21,173), aged 59 years, admitted Nov. 9th, 1897, complaining of "dropsy." His family history was negative. He had been a moderate drinker, and denied syphilis.

Present illness began four months previously with swelling of the abdomen. This increased gradually, and at the end of two months he was tapped by his physician, who drew off a large amount of bloody fluid. Soon after the abdomen began to enlarge again, and this continued until the present admission. With this swelling of the legs came on. There had been some pain in the lower abdomen. His appetite had varied. He had occasional vomiting of mucus but no blood. The bowels had been irregular. There had been great frequency of micturition.

Examination showed emaciation, but not cachexia. The thorax was negative. The abdomen was distended symmetrically. Movable dulness and fluctuation were obtained. The liver-dulness began at the fifth rib in the right nipple line, and only extended a distance of 4 cm. Its edge could not be felt. There was œdema of the legs, genitalia, and lower trunk.

The case was suggestive in some ways of cirrhosis of the liver, although the history of bloody fluid being obtained on previous tapping pointed to malignant growth. The absence of any stomach symptoms seemed against a primary growth there. The patient required tapping, and it was thought best to do this by an exploratory operation.

Operation.—On the abdominal cavity being opened a bloody turbid fluid was obtained. A mass was found in the stomach, and secondary deposits over the peritoneum. The fluid showed numerous red corpuscles and leucocytes. There were also large cells many times the size of a leucocyte, some of which contained more than one nucleus. No signs of caryokinesis were seen. Certain groups of cells were found which were very suggestive of masses of cancer-cells. After the operation a firm mass was to be felt in the left hypochondrium. In the right hypochondrium several nodules were felt. The patient was much easier after the operation, but died suddenly on Dec. 5th, 1897.

Autopsy showed colloid carcinoma of the stomach along the lesser curvature from the cardia to the pylorus. The pylorus was converted into a dense ring, and the growth extended for a short distance into the duodenum. The œsophagus was invaded, but the cardiac orifice was not narrowed. The omentum and peritoneum were involved. The stomach was adherent to the liver, spleen, and diaphragm. The growth extended through the diaphragm to the pleura.

In reviewing this interesting series of cases, and particularly in the study of the autopsy records, one is astonished to notice how extensive and widespread the disease may be with practically no symptoms. In three of the cases a very large part of the stomach was involved, in two the cardiac orifice, and in two the pylorus. In one instance the growth involved the œsophagus, and in one to a slight extent the duodenum. In three instances there was ulceration, and in six metastases were present.

CHAPTER XIII.

PATHOLOGICAL ANATOMY.

POSITION OF THE GROWTH—PRESENCE OF ADHESIONS—ULCERATION—SIZE OF THE STOMACH—DILATATION—CONTRACTION—METASTASES—PERFORATION—SUMMARY OF THE CASES—PERITONITIS—ASCITES—JAUNDICE—TUBERCULOSIS—STATE OF THE LUNGS—CIRCULATORY SYSTEM—MISCELLANEOUS—CLASSIFICATION OF GASTRIC CANCERS—SECONDARY CANCER OF THE STOMACH.

FORTY-TWO cases of this series came to autopsy in the hospital, and in four partial records were obtained from examinations made outside. These cases occurred in the first 1000 autopsies at the Johns Hopkins Hospital. Among the series were two cases of multiple primary carcinoma. During the same time there were three cases of secondary carcinoma, and one case of secondary sarcoma of the stomach.

The general features of the series may be given, and first the position of the growth, stated in tabular form, and with Welch's percentages from 1300 cases for comparison.

Situation.	Number.	Percentage.	Welch's percentage.
Pyloric region . .	24	53·3	60·8
General involvement .	6	13·3	4·7
Lesser curvature .	5	11	11·4
Greater curvature .	3	6·6	2·6
Cardia . . .	3	6·6	8
Posterior wall . .	3	6·6	5·2
Fundus . . .	1	2·2	1·5

Of the 24 cases situated in the pyloric region, the pylorus alone was involved in 3, in 6 there was stenosis of the pylorus,

and in 3 the growth extended to the duodenum. Of the cases in which the cardia was involved—taking both those in which there was general involvement, and where the cardia only was affected—a total of 9, the growth extended to the œsophagus in 5. Thus, 1 out of 8 cases in the pyloric region extended to the duodenum, while over one-half of the cases at the cardia extended to the œsophagus. The total cases affecting the cardia, lesser curvature, and pylorus were 31, a percentage of 70·4.

Adhesions were present in 24 out of 43 cases, and varied from recent, easily-broken-down adhesions to old ones, which bound the viscera together in an almost solid mass. The omentum was adherent in 10 cases, and usually rolled up and puckered. In 8 there were adhesions to the colon, in 7 to the liver, in 4 to the spleen, in 3 to the pancreas, in 2 each to the duodenum and mesentery, and in one each to the gall-bladder and diaphragm. In one case in which the colon was adherent, its wall was much thickened at the point of contact, and there were papillomatous growths projecting into its lumen, but no perforation. In five out of six perforation cases, adhesions were formed which cut off the perforation and prevented a general peritonitis. The situation of perforation in cancer and the early formation of adhesions over the area of the ulcer are here all-important factors.

As to the influence of adhesions on the movements of the tumour, the statement is made by some writers that only stomach tumours with adhesions show movement with respiration. Among 50 cases with *visible* descent of the tumour there were 9 that came to autopsy. Adhesions were present in 6 of these. Of the 3 cases without any, in 2 the growth was at the pylorus. The occurrence of adhesions, with the situation of the growth, is shown in the table below :—

Situation of growth.	Number of cases.	Adhesions present.
Pylorus	24	13
General	6	4
Lesser curvature . .	4	3
Greater curvature . .	3	1
Cardia	3	1
Posterior wall . .	3	2

Ulceration.—This was present in 35 out of 44 cases. The

situation of the growth in reference to ulceration is shown in the following table :—

Situation.	Pylorus.	Walls.	General.	Cardia.
Ulceration. .	21	7	4	3
No ulceration .	3	4	2	0

The appearance of the ulcerated parts varied from mere superficial erosions of small size to large areas. The two largest ulcers measured 9·5 by 10 cm. and 8 by 12 cm. In 16 cases accurate measurements of the extent were obtained, and the average area of these was 36·5 square centimetres. In some the ulcers were multiple. The edges of the ulcers were frequently elevated and overhanging, and some showed villous projections. Fungoid masses were found in some. In others there were small nodular masses. The depth varied from superficial destruction to perforation of all the coats. Among 27 cases where the extent was noted, it involved the mucous membrane in 10, extended to the muscular coat in 3, through to the peritoneum in 8, and in 6 there was perforation. In one case there was marked cicatrisation, involving nearly the whole of the lesser curvature in a dense mass. The pylorus in this case was involved, and the ulceration extended into the duodenum. The ulceration in some cases also extended into the œsophagus.

Size of the Stomach.—The stomach was found *dilated* in 14 cases, of which the growth was at the pylorus in 12, and in the remaining two cases, in one on the posterior wall and at the cardia in the other. In the case with growth on the posterior wall there was an oval sloughing mass, 8 by 12 cm.; its edges were firm, but the centre was excavated. There were firm adhesions between the stomach, colon, and pancreas. The pylorus was patent. In the other case there was a growth at the cardia with an ulcerated surface, which extended a distance of 5 cm. into the œsophagus. The cardiac orifice was 75 cm. in circumference. In every case with stenosis of the pylorus there was dilatation.

Contraction of the organ was found in 7 cases, in 5 of which there was general involvement. In one case the lesser curvature was chiefly involved, and in the remaining case the growth was mainly in the pyloric region, though the pylorus itself was not

involved. In none of the cases was there any stenosis of the pyloric orifice. Out of six cases of general involvement there was contraction in five.

Metastases.—These were present in 39 out of 45 cases, or in 86·6 per cent. Welch's tables of 1120 cases give the occurrence as 63·4 per cent. Ewald states the frequency to be about 3 out of 4. The largest number occurred in the lymph-glands, a total number of 30 ; and of these the gastro-hepatic were affected in 21, the peritoneal in 9, posterior mesenteric in 6, supraclavicular and posterior mediastinal in 2, iliac bronchial, pericardial, anterior mediastinal, and axillary in one each. The liver was the seat of metastases in 23, peritoneum 11, pancreas 8, bowels 8 (small bowel 3, colon 2, duodenum 1), kidney and lungs each 4, pleura 3, spleen and diaphragm each 2, ribs, vertebræ, skull, ilium, femur, heart-muscle, pericardium, abdominal wall, vesico-rectal cul-de-sac, hydrococele sac, and ureter each one.

Perforation.—This occurred in 6 cases in the series, giving 4 per cent. Of 507 cases collected by Brinton, it was present in 3⅓ per cent. Acute general peritonitis was only present in one of the 6 cases ; perforation occured in the middle of the anterior wall. In 5 cases adhesions had walled off the general peritoneal cavity, and the resulting condition might be termed more or less chronic. This is a very different picture to that met with after perforation of a simple gastric ulcer. Probably the greater liability of ulcers on the anterior wall of the stomach to perforate has considerable influence. The anatomical considerations influencing the result of a perforation here are also important—movements and varying distension rendering it difficult for adhesions to form in this situation.

In 3 of the 6 cases the growth was in the pyloric region—one of which extended along the anterior wall and perforated there—in two on the posterior wall and in one at the cardia. Taking the total number of cases, of 24 with growth in the pyloric region, perforation occurred in 3, of 3 on the posterior wall in 2, and in one of 3 cases at the cardia.

As to the conditions found as a result of perforation, as already said, general peritonitis occurred in one. In three there was the formation of an abscess cavity, one subdiaphragmatic from perforation at the cardia, one communicating with an abscess in the left lobe of the liver from perforation of the posterior wall, and one with an abscess cavity between the stomach and pancreas

from a perforation near the pylorus. In one instance of perforation of the posterior wall it was covered by adhesion. In the sixth case there were two perforations on the anterior and posterior surfaces into the colon and duodenum. Out of 877 cases of Dittrich, Brinton, Lange, gastro-colic fistula was present in 25 or 2·8 per cent. The simultaneous occurrence of gastro-colic and gastro-duodenal fistula must be rare.

The autopsy findings are given briefly :—

No. 8.—M. K. Perforation near pylorus, in the centre of an ulcer 7 by 6½ cm. The pancreas was adherent to the stomach, and between them was a cavity filled with a yellow slough.

No. 32.—J. M. Perforation at cardia, sub-diaphragmatic abscess, adhesions between stomach, liver, spleen and diaphragm. A large abscess cavity was found.

No. 52.—A. B. Perforation of the anterior wall, general fibrino-purulent peritonitis.

No. 68.—J. C. Ascites, growth throughout peritoneum. Perforation 3 mm. in diameter on the centre of the posterior wall completely covered by adhesions. No general peritonitis.

No. 92.—C. W. Liver, diaphragm, and stomach all bound together. An ulcer 6 by 4 cm. on the posterior wall of the stomach,—perforation and communication with the left lobe of the liver, which was riddled with abscesses.

No. 113.—H. C. Stomach, colon, duodenum, and pancreas all bound together. To the pyloric region the colon was adherent anteriorly and the duodenum posteriorly. In the pyloric region was an ulcer 5 by 6 cm. There were perforations, each 2 cm. in diameter, one on the anterior and the other on the posterior surface into the colon and duodenum.

The clinical features are discussed elsewhere. None of the cases gave any marked symptoms, except in the one case of general peritonitis.

Peritonitis was present in 5 cases. Of these, 3 were post-operative, 2 being after operations on the stomach, and the third in the case of multiple primary carcinoma in which a growth was removed from the cæcum. The peritonitis in one case, already referred to, was due to perforation. In the fifth case, no perforation was found. The ulcer extended through to the serosa.

Ascites was present in 6 cases. As already spoken of under the clinical symptoms, it may obscure all other conditions. Of

these cases there were secondary deposits in the peritoneum in 4, and in none of these was the liver the seat of metastases, although in one there were lymph-glands involved close to the liver, which was tightly adherent, though showing no secondary growths. The two remaining cases showed metastases in the liver, but none in the peritoneum.

There were 11 cases of metastases in the peritoneum and 23 in the liver. So that 4 out of 11 cases of peritoneal involvement showed ascites, and only 2 out of 23 cases of liver metastases. It may be mentioned that in 3 of these 23 cases hydrothorax was present.

The fluid varied from clear serous to sero-hæmorrhagic. The occurrence of various cellular elements in the fluid has been discussed elsewhere.

Jaundice.—This was found at autopsy in but two cases. In one there was a solid carcinomatous mass in the common bile duct, 5 cm. in circumference. The gall-bladder was enlarged, tortuous, and 14 cm. in length. No bile could be squeezed through the duct, and all the bile ducts were enormously enlarged. In the second case the liver was enormously enlarged, and largely composed of a mass of nodules which varied in size from a split pea to a pigeon's egg.

Tuberculosis.—Tuberculous lesions were found in the lungs in 11 cases. In 6 of these the condition was old and quiescent, in the remaining 5 it was recent. Tuberculous peritonitis was present in one case.

Lungs.—The most frequent condition was œdema, which was present in 12 cases, the slow death from asthenia contributing to this. Bronchitis, bronchiectasis and broncho-pneumonia were found in 8 ; pleuritis and hydrothorax in 4 ; anthracosis in 3 ; pneumonia, chronic interstitial pneumonia and infarction (one being hæmorrhagic) in 2 ; and in one case pneumothorax.

Circulatory System.—There were 9 cases showing arterio-sclerosis ; a heart lesion was present in 7 ; thrombosis in 4 ; atheroma in 2 ; embolus in the coronary artery and acute endo-carditis each in one instance.

Miscellaneous.—Nephritis was found in 19 cases. Fatty degeneration of the liver was present in 10 cases. There was one instance of each of the following : cholelithiasis, cirrhosis of the liver, acute splenic tumour, hæmorrhagic infarcts of the spleen, myoma uteri, and ovarian tumour.

Classification of Gastric Carcinomata.—Great variation is found among the writers on this subject, both in the methods of classification and in the relative percentages in each class. Owing to the absence of a common standard, statistics as to the relative frequency of the different varieties have little value. By external and microscopical features cancers of the stomach may be divided into soft, hard, and colloid, the frequency being in the order named. Another division is into the four varieties, of medullary, scirrhus, adeno-carcinoma, and colloid. But as forms occur which are between typical instances of these groups, accurate classification is difficult.

Taking the histological structure, Perry and Shaw[1] have adopted a convenient classification in the study of 50 cases, dividing them primarily into (*a*) cylindrical carcinomata, which include the growths variously termed adeno-carcinomata, cylinder epitheliomata or destructive adenoma, and (*b*) spheroidal carcinomata. In either case, if the fibrous stroma be abundant the term scirrhus is applied, or if scanty the term medullary. In either case again the cells may have undergone colloid change. A classification of this kind seems very convenient, and the 36 cases of this series which have accurate histological notes are arranged under the headings (*a*) Adeno-carcinoma, and (*b*) Carcinoma simplex.

The number of cases of adeno-carcinoma was 13, and of carcinoma simplex 23. Their relations of position of the growth are shown in the accompanying table:

Type of growth.	No of Cases.	Pylorus.	Stenosis of Pylorus.	Lesser Curvature.	Greater Curvature.	General.	Posterior Wall.	Cardia.
Adeno-carcinoma	13	6	2	3	3	1	0	0
Carcinoma simplex	23	16	4	1	0	2	3	1

The relations of the two types to the occurrence of ulceration and metastases are also given:

Type of growth.	No. of Cases.	Ulceration.	Metastases.	Metastases in glands.	Metastases in liver.	Metastases in peritoneum.
Adeno-carcinoma	13	9	12	10	6	2
Carcinoma simplex	23	20	22	15	13	7

[1] *Guy's Hospital Reports*, 1891.

There were no striking differences as regards ulceration and the occurrence of secondary growths between the two forms.

Regarding the duration of the disease in the types of growth there was no special difference noticed. The latent cases were equally divided between the two types. The figures are given in tabular form :

Type of growth.	Duration under 3 months.	3 to 6 months.	6 to 12 months.	12 to 18 months.	18 to 24 months.
Adeno-carcinoma ...	6	4	7	1	1
Carcinoma simplex ...	4	3	1	0	2

The occurrence of **secondary carcinomatous growths** in the stomach is relatively infrequent. Welch collected 37 cases, of which 17 were secondary to cancer of the breast, 8 to cancer of the œsophagus, 3 to cancer of the mouth and nose, and the remainder to other parts. Ewald[1] in an article on cancer of the stomach quotes John S. Ely as having collected 14 cases, of which the œsophagus was the primary seat in 6, the breast in 3, testicle in 2, and one each in the leg, suprarenal gland, and large bowel.

These cases are not of great importance from a clinical standpoint. The recognition of a secondary growth in the stomach would of course contra-indicate operation on a primary growth elsewhere. The question of early diagnosis by chemical findings would be an interesting one, especially if cases, described by Fenwick, of atrophy of the gastric mucous membrane in cases of malignant growth elsewhere are frequent.

In the same period as the 150 cases of primary cancer, and among the first thousand autopsies in the Johns Hopkins Hospital, there were three cases of secondary cancer of the stomach. Two of these were secondary to growth in the pancreas, and one to growth in the uterus.

Two of the cases presented gastric symptoms. In the first case there was jaundice and ascites, and a tumour was felt in the epigastrium. The stomach contents showed free hydrochloric acid, although on subsequent washings typical "coffee-grounds" material was obtained. Operation showed cancer of pancreas and a large adherent mass. In the second case there were gastric symptoms and a tumour mass in the epigastrium.

[1] *Real-Encyclopädie der gesammten Heilkunde.*

There was ascites. The stomach findings were negative. In both these instances the primary growth was in the pancreas. In the remaining case the primary growth was in the uterus, and there were no gastric symptoms. The cases are quoted briefly.

Primary Growth in Pancreas; Secondary in Stomach; Jaundice; Ascites; Operation; Autopsy.—E. V. (hosp. no. 8,477), male, aged 34 years; admitted Oct. 24th, 1893, complaining of swelling in the upper abdomen, dyspepsia and jaundice. He had noticed a gradual loss of strength for a year without any evident cause. Jaundice came on one month before admission. Swelling of the abdomen came on recently. He had lost about 30 lbs. in weight.

Examination showed emaciation and jaundice. The abdomen was distended, most markedly in the epigastrium. In the right epigastric region a distinct nodule was palpable, which descended with respiration. The liver was not felt. There were palpable enlarged glands above the left clavicle. The first test breakfast yielded 100 cc. of fluid, with a total acidity of 45. Free HCl was present. On subsequent washings there was typical "coffee-grounds" material in the fluid. The presence of free HCl could not again be demonstrated.

Operation.—An exploratory operation was deemed advisable, and this was done by Dr. Halsted on Nov. 4th. A large mass was found involving the colon, stomach and deeper structures. It was judged to be impossible of removal, and no further examination was made.

The patient was more comfortable after the operation, and experienced great relief from the lessened distension. He died on Nov. 18th.

Autopsy showed primary carcinoma of the pancreas, with secondary deposits in the peri-pancreatic tissues, the stomach, duodenum, and many of the lymph-glands. In the stomach, on the lesser curvature, about the middle, was a mass 8 cm. in diameter. The mucous membrane adjacent was thickened and nodular in character.

Carcinoma of Pancreas; Secondary in Stomach; Tumour; Chylous Ascites; Autopsy.—B. S. (hosp. no. 8,765), female, aged 55 years; admitted Dec. 5th, 1893, complaining of pain in the back and stomach region, with swelling of the legs. The present illness began only four or five weeks before admission. She first complained of pain in the back that ran round to the stomach. At the same time she had frequent vomiting, which lasted only for about one week. This was not associated with the pain. Beyond general feelings of weakness she had felt otherwise well.

Examination showed emaciation and anæmia. The abdomen was

full, especially in the umbilical region, where peristaltic waves were visible. Splashing was readily obtained. Stomach tympany extended to the navel. Between the navel and xiphoid was a distinct nodular mass, which descended with inspiration so that the fingers could be placed above it. Between this and the right costal margin was another mass, also hard and resistant. Near the navel was another nodular mass.

Several test breakfasts were given. Neither free HCl nor lactic acid was obtained. On one occasion the tube was streaked with fresh blood.

Dec. 16th.—The abdomen was tapped, and 4,160 cc. of opaque chylous fluid obtained. Microscopically it contained numerous red blood-corpuscles, and some leucocytes, but no epithelial cells were seen. The day after the tapping the mass in the epigastrium was more evident. In addition, below the umbilicus was a ridge-like mass, which varied much in prominence, and was felt to alternately relax and contract under the hand. Gas could be felt and heard gurgling through under the hand. Below this there were many nodular masses readily felt. The patient gradually became emaciated, and died on Jan. 4th, 1894.

Autopsy showed cancer of the head of the pancreas with extension into the duodenum and stomach. The lymph-glands and both adrenals were also involved. There were secondary deposits in the liver and lungs. There was a large mass in the centre of the abdomen. On opening the stomach *in situ* the pylorus appeared as a rigid tube 3 cm. in diameter. The organs involved formed a continuous mass.

Cancer of Cervix Uteri; Operation; Autopsy.—E. S. (hosp. no. 18,476), female, aged 61 years, admitted Jan. 28th, 1897, complaining of uterine symptoms and loss of weight. Her main complaint was of gradual loss of weight and strength for about one year past. She has not had any digestive symptoms, and the only pain complained of has been in the inguinal region.

Scrapings from the endometrium were examined, and a diagnosis of carcinoma of the cervix uteri made. On Feb. 15th she was operated on. The growth was found to be adherent to the bladder. The uterus was removed. After the operation there was nausea and vomiting for seven days. The patient gradually sank and died on Feb. 26th.

Autopsy showed cancer of the cervix uteri with involvement of the broad ligaments. There were metastases in the stomach, which was enormously dilated. Near the pylorus was a small ulcer, which was deep and the edges of which were much raised. The stomach mucous membrane showed atrophy. There were no secondary growths in any other organ.

CHAPTER XIV.

TREATMENT.

IMPORTANCE OF EARLY DIAGNOSIS AND EXPLORATORY OPERATION—MEDICAL TREATMENT—DIET, STOMACHICS, LAVAGE—SPECIAL SYMPTOMS—PAIN, VOMITING, CONSTIPATION—SURGICAL TREATMENT: EXPLORATION, RADICAL OPERATION, PALLIATIVE OPERATIONS, GASTROSTOMY FOR CANCER OF THE CARDIA, GASTRO-ENTEROSTOMY FOR STENOSIS OF THE PYLORUS.

EARLY diagnosis and thorough removal have made a great change in the prognosis of cancer of the breast and of the uterus, but it is not probable that an equal success can be obtained in malignant disease of the stomach. The handicap is too great. Carcinoma of the regions mentioned does not mean, at least in the early stages, any special interference with the general nutrition; but in that of the stomach, in addition to the presence of the growth, there is interference with digestion and nutrition. Riegel says: "Der Kranke ist von seinem Magencarcinom befreit, aber er ist nicht magengesund." Atrophy of the gastric glandular elements is common, and this condition remains after removal of the tumour, so that the patient has the additional burden of a crippled digestive system. Yet the future may offer more than at present we may think possible. A hopeful outlook depends on two things—early diagnosis, and operation. The importance of the former cannot be overestimated. The prospects will be better when we study every case of stomach trouble (other than transient), between the ages of forty and sixty, with a view to the possibility of malignant disease. If we hear that a woman of a certain age complains of a bloody discharge from the uterus, the possibility of malignant disease is at once thought of; but how many of us consider a like grave possibility when a patient of the same age complains of stomach symptoms perhaps with

a moderately sudden onset? With the graver conditions kept in mind, they are less apt to be overlooked in the diagnosis. When we remember the importance of an early operation, and consider the saying of Czerny and Rindfleisch,[1] that the presence of a positively diagnosed tumour is a contra-indication to radical operation, the necessity of more attention to the points of early diagnosis is evident.

The question of treatment may be taken up under two heads, medical and surgical. The first applies to all cases too advanced for radical operation, or where this is refused, or when only a palliative operation can be done. The second comprises two groups of cases, first those in which removal of the entire growth can be accomplished, and secondly those in which operation is indicated on account of narrowing of an orifice.

Medical Treatment.—The problem given is to nourish as well as possible an individual whose gastric functions are generally much interfered with. We can only hope to prolong life with as much comfort as possible. The first essential is careful regulation of the diet. For this no absolute rule can be laid down. Every patient should have his own dietary. In the majority of the cases there is some motor insufficiency which must be kept in mind. Food, as a rule, should be given in small amounts, and in the most digestible form. Liquids have to be given sparingly. The thirst is sometimes troublesome, and for this hot water taken half an hour before the meals is best; or liquid may be given by the bowel. Milk is frequently well taken in small amounts. If raw milk does not agree, the various modifications may be tried. The addition of salt to the raw, or especially to the boiled milk, often renders it more palatable. Soups and meat extracts are usually well taken. Meats require to be finely minced, and the coarser varieties are better omitted. Eggs in various forms are useful. Fats are usually not good. It may be necessary to give peptonised foods as far as possible. The carbo-hydrates often give discomfort through fermentation, and may require to be largely omitted. Vegetables as a rule can only be given very sparingly, and the coarser ones are better left out of the list. Stewed fruits are helpful, especially in cases where there is an irresistible desire for something of a vegetable nature. The not infrequent

[1] "Dass der Magenkrebs nicht mehr radical operirt werden sollte, wenn man ihn als Tumor sicher diagnosciren kann."

longings for special articles of diet may be indulged as far as possible, which often agree better than one would have expected. In addition, the gratifying of these desires has often a very comforting effect on the patient's general condition. When necessary, nutrient enemata may be given.

With the question of diet goes that of treatment by medicinal means. A stomachic is usually of service, and the majority of the bitters have been recommended for this at various times. Condurango is often beneficial, and it may be given with hydrochloric acid. Quassia, gentian, calumba, and nux vomica may be used. In some cases the administration of hydrochloric acid and pepsin is of help. They should be given in sufficient doses. To no special drug in this connection can any specific action be attributed. Alcohol is often useful: good whisky, taken either neat, when the stomach is empty, or diluted with soda water or apollinaris. In connection with this phase of the subject the statement of Boas, that the best stomachic is lavage, may be emphasized. The use of the stomach-tube is nearly always indicated. Even in patients without any dilatation occasional lavage is valuable. In such cases washing once in every two or three days is enough. Motor insufficiency is always an indication for the use of the tube, and it may exist without enlargement of the stomach. In cases with ulceration the washing removes adherent decomposing and irritating material. The history of hæmorrhages and the presence of ulceration are no counter-indication to the use of the stomach-tube, if ordinary gentleness be exercised. We have not had any instance in this hospital of injury done in such cases by the tube. As a general tonic arsenic usually does best, and at times seems to be of some temporary benefit, along with the general treatment by diet, etc. The use of antiseptics has not seemed to be of much value, though sometimes the carbolic acid or creasote (♏ i), and tincture of iodine (♏ ii), in glycerine (ʒ i) is useful in allaying fermentation.

In cases with a growth obstructing the cardia, food requires to be liquid and given in small amounts. A tube may be introduced, but little can be done in the way of medical treatment for these cases, and their surgical handling will be spoken of later. With stenosis of the pylorus and resulting dilatation, the treatment is largely that of the latter condition. The liquids should be reduced in amount, and the food given in as concentrated a form as possible. The daily use of the stomach-tube is

indicated. Opinions vary as to the proper time of day for lavage. In the majority of patients it is best at bedtime, and at least four hours after the last meal. This is especially advisable if the patient has had disturbed nights from pain. Nothing should be taken into the stomach until the next morning. In others the early morning is best. Some writers advise its use before the evening meal. Plain water may be used for the lavage, or various mild antiseptics, such as boracic acid, thymol, salicylic acid, etc., may be added. Sodium bicarbonate is often useful.

Certain symptoms may be spoken of in detail.

Pain.—This usually requires attention at some period or other, although in many instances it is never very severe. The regulation of the diet and the use of the stomach-tube tend largely to reduce the suffering. By these means the accumulation of irritating products is prevented. Drugs of some sort have to be used in the majority of cases. Chloroform in doses of 3—5 ♏, and chloral, are sometimes helpful. The German writers speak highly of belladonna, which may be given along with any of the other drugs mentioned. Codeia in doses of a quarter to half a grain has been of much service. Morphia is generally a last resort, and may be given by mouth with bismuth, or hypodermically with atropine. Small doses of morphia ($\frac{1}{12}$ gr.) with bismuth and soda, repeated every two or three hours, best controls the constant gnawing pain which is so distressing in some cases.

Vomiting.—Lavage is really the most efficient means both to prevent and to check. The various gastric sedatives may be used, but where there is dilatation drugs are of little service. When there is vomiting of blood, the patient should be kept quiet, nothing should be given by mouth for some hours, and then the nourishment should be in small quantities and cold. Cold may be applied to the epigastrium. Morphia is usually indicated. The use of styptics by mouth is of very doubtful utility. Ergotin hypodermically may be used. The hæmorrhage is rarely profuse enough to cause death.

Bowels.—The condition of the bowels often offers much difficulty. Constipation is very common, especially in the cases with pyloric stenosis. Regulation by diet is usually not possible. Severe purgatives are contra-indicated, and the gentler laxatives have to be used. We have found the use of the fluid extract of Cascara sagrada of great assistance. Small doses of podophyllin and belladonna may be added. The majority of writers

advise against the use of the salines. Yet in some cases they do well and give the best results. The mercurial purgatives are not often of service. Whatever purgative is used it is best given immediately after lavage. With all of these the occasional use of enemata may be necessary. The use of soap or glycerine suppositories is often advantageous. Diarrhœa of less frequent occurrence (sometimes caused by the passage of irritant material from the stomach), may be relieved by the previously indicated treatment. The various antiseptics and astringents—bismuth, chalk, catechu, etc., with small doses of opium—may be used.

Surgical Treatment.—This offers the only chance of recovery. To attain the best possible results the physician and surgeon must co-operate. For the former it is the difficult question of early diagnosis, so that the cases may be placed in the hands of the surgeon at the earliest possible date. From the surgeon the physician has the right to ask that his technique and methods be of the best. It is through co-operation of this kind that the surgery of the stomach has made such advances, and that gastric cancer has been removed from the class of absolutely hopeless diseases.

The medical aspects of the problem of diagnosis have been discussed in almost every chapter. The important aid of an exploratory operation should be more frequently advised. In other obscure abdominal disorders it is a common precedure—why not in gastric conditions? The risk is comparatively slight, and is much less than that of an undiagnosed neoplasm. In a suspected case, when under treatment there is no improvement in a few weeks, an exploratory operation is justifiable. In such cases permission should be obtained for radical operation if a growth be found. The operation should by no means be advised merely as a diagnostic measure, in the case of a patient who is run down and anæmic. The risk is here greater, and a few unfortunate results would soon bring discredit on a procedure perfectly correct under other conditions. The question as to the advisability of operation often arises in later stages, when only a palliative procedure is possible. As a general rule among our series the patients have stood operative interference worse than their general condition would have led one to anticipate. Nutrition and the organs of nutrition have suffered more than is supposed from outward appearance. After operation the impaired powers of digestion may be enough to turn the scale

in the wrong direction. Rapidity of operation is an important point in such cases. A careful study of the blood before operation should be made, as masked anæmia with a low hæmoglobin percentage should be a bar to any but imperative operation. On the whole, our experience with exploratory operation as a diagnostic measure in obscure disorders of the abdomen has been most favourable. It has been very exceptional to have a case "go wrong"; on the other hand, the exploration *per se* is occasionally followed by remarkable results, as in the case of Dr. Keen's already referred to.

The surgical procedures, apart from the exploratory section, may be considered under the head of radical and palliative operations. We are not discussing the question from the surgical standpoint. There are many recent excellent articles on the subject, the most recent by Mayo Robson.[1] The results of recent years are encouraging, and the future should show a marked increase in the percentage of recoveries. The indication for the radical operation can only be reached by a thorough inspection after the abdomen is opened.

The operations of the second class are undertaken most frequently on account of stenosis of one of the orifices. To open the stomach and scrape the tumour, as has been suggested, is of doubtful utility. Stenosis of the cardia requires treatment in many cases. This may be helped temporarily by the passage of tubes—as in œsophageal stricture—but such methods have little to recommend them. The best procedure is gastrostomy, *which should be done early*. Carcinoma of the cardia offers a poor field for removal, but the diagnosis is usually made some time before total obstruction is present. With the first signs of obstruction the opening should be made. To wait until the patient has lost much ground, is feeble, emaciated and anæmic, is to court disaster. It is unfair to the surgeon to call him in to do this operation when the patient is well-nigh moribund. The operation as now done is so simple, and gives such good results, that no hesitation should be felt about advising its early performance. The patient's life will probably be prolonged, and with much less suffering. As in carcinoma of the œsophagus, the cessation of the passage of food over the diseased area is usually associated with much less pain and discomfort.

[1] "The Hunterian Lectures on the Surgery of the Stomach."—*Brit. Med. Journ.* 1900, I., p. 562 *et seq.*

An artificial communication between the stomach and some part of the small intestine is frequently required when pyloric stenosis, with its attendant results, is present. By this life is prolonged, nutrition is improved, and discomfort lessened. As with the previous operative measures, it should be recommended while the patient is in a condition to ensure a reasonable prospect of recovery.

INDEX.

PAGE

Abscess following Perforation 49
Abdomen, Inspection of 58
Acute Carcinoma of Stomach 126
Adhesions 139
Alcohol, Influence of 13
Anæmia 114
„ Pernicious 114, 119
Aorta, Abdominal Throbbing 61
„ „ Visible 59, 80
Appetite, Symptoms relating to 38
Ascites 55, 142
Atrophic Cancer of Stomach 83
„ „ „ Clinical Features of 84

Bacillus, Oppler-Boaz 46
Blindness following Hæmatemesis 36
Blood, Concentration of, in Dilated Stomach 81
„ in Cancer of Stomach 113
„ „ Stomach Contents 40
„ Vomiting of 33
Bowels, State of 48

Cancer, Increase of 2
Cancer of Stomach, Question of Increase 5
„ „ at Johns Hopkins Hospital 6
„ „ Classification of 144
Chills 47
Chronic Cases 128
Cirrhosis Ventriculi 90
Course of the Disease 128

Etiology 1

Family History 10
Fever 46

PAGE

Gastric Juice, Alkaline 45
„ „ Examination of 41
„ „ Neutral 45
Glands, Enlarged 48
„ Metastases in 141
„ „ simulating Stomach Tumour 110
„ Supra-clavicular 48

Hæmoglobin 115
Heredity 11
Hour-glass Stomach 77
Hydrochloric Acid 41

Improvement, Causes of 125
Irritation, Influence of 13

Jaundice 55, 143

Lactic Acid 44
Laparotomy, Exploratory 152
Latent Cases 129
Leucocytes, Differential Count of 117
Leucocytosis 115
„ Digestion 118
Linea alba, Hardening of 52
Liver, Metastases in 55, 143

Massachusetts General Hospital, Cancer of Stomach at 6
Metastases at Navel 52
Metastases 133, 141
Mobility of Tumours, Mechanical 63
Montreal General Hospital, Cancer of Stomach at 7
Movement, Intrinsic, of Stomach 61
Myelocytes 118

Navel, Metastases at 52
Nephritis 129, 130, 143

Œdema 56
Onset, Mode of 29

Pain 31
Pathological Anatomy 138
Perforation 49, 141
Peritoneum, Metastases on 143
Peritonitis 142
Polycythæmia 80, 113
Pyloric Region, Tumours of 138
Pylorus, Hypertrophic Stenosis of 18, 99

PAGE

Pylorus, Normal, Palpable 59, 100
„ Stenosis of, by Dislocation 101
„ Thickening and Induration of 93
„ Tumours of 92
„ Nodular Tumours of 99
„ Tubular Tumours of 99

Red Corpuscles 113
„ „ Nucleated 115

Sarcinæ 46
Secondary Cancer of Stomach 145
Skin, Pigmentation of 123
Stomach Contents, Examination of 39, 45
„ Contracted 83, 140
„ Dilated 68, 140
„ „ Characters of 71
„ „ Peristalsis in 71
„ „ Local Tumours in 74, 75
Stomach Wall, Tumours of 104
„ „ Massive Tumours of 108

Thrombosis of Veins 57, 131
Trauma, Influence of 13
Treatment, Medical 149
„ Surgical 152
Tumour, Incidence of 58
„ Mobility of 59
„ Position of 58
„ Movement of, with Respiration 60
„ „ from Aorta 61
„ Phantom 62

Ulcer, Gastric, Induration about 95
„ „ Cases of 95
Ulceration 139
Umbilicus, Metastases at 52
Urine, State of 48

Veins, Thrombi in 57
Vomiting 33
Vomitus, Characters of 33, 41
„ Examination of 39
„ Offensive 37

Weight, Gain of 126
„ Loss of 39

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A Treatise on Human Anatomy in its Application to the Practice of Medicine and Surgery

By JOHN B. DEAVER, M.D.

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